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The  
University of Minnesota  
Bulletin

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School of Agriculture

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1909-1910



Volume XII

June 15, 1909

No. 10

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The University catalogues are published by authority of the Board of Regents, as a regular series of bulletins. One bulletin for each college is published every year and in addition a bulletin of general information outlining the entrance requirements of all colleges of the University, and embodying such items as University equipment, organizations and publications, expenses of students, loan and trust funds, scholarships, prizes, etc. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, the college or school of the University concerning which information is desired should be stated. Address,

THE REGISTRAR,

The University of Minnesota,

Minneapolis, Minnesota.



# CALENDAR FOR 1909-1910

1909

1910

## JULY

S.	M.	T.	W.	T.	F.	S.
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
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## AUGUST

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## JANUARY

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## MARCH

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## MAY

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## JUNE

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# The University

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges and departments:

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

THE DEPARTMENT OF AGRICULTURE, including—

THE COLLEGE OF AGRICULTURE

THE SCHOOL OF AGRICULTURE

THE DAIRY SCHOOL

THE SHORT COURSE FOR FARMERS

THE SHORE COURSE FOR TEACHERS

THE SCHOOL OF TRACTION ENGINEERING

THE FORESTRY SCHOOL

THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

THE MAIN STATION AT ST. ANTHONY PARK

THE SUB-STATION AT CROOKSTON

THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

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Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

# The Board of Regents

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CYRUS NORTHROP, LL.D., MINNEAPOLIS . . . .	<i>Ex-Officio</i>
The President of the University	
The HON. JOHN LIND, MINNEAPOLIS . . . . .	1914
The President of the Board	
The HON. JOHN A. JOHNSON, ST. PETER . . . .	<i>Ex-Officio</i>
The Governor of the State	
The HON. C. G. SCHULZ, ST. PAUL . . . . .	<i>Ex-Officio</i>
The State Superintendent of Public Instruction	
The HON. THOMAS WILSON, ST. PAUL . . . . .	1915
The HON. A. E. RICE, WILLMAR . . . . .	1915
The HON. B. F. NELSON, MINNEAPOLIS . . . . .	1910
The HON. PIERCE BUTLER, ST. PAUL . . . . .	1910
The HON. CHARLES A. SMITH, MINNEAPOLIS . . . .	1910
The HON. S. M. OWEN, MINNEAPOLIS . . . . .	1913
The HON. W. J. MAYO, ROCHESTER . . . . .	1913
The HON. HENRY B. HOVLAND, DULUTH . . . . .	1914

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Secretary of the Board

# The School of Agriculture

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## FACULTY

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DEXTER D. MAYNE, Principal

J. A. VYE, Secretary

J. M. DREW, Registrar

FANNIE C. BOUTELLE, Preceptress

ANNA M. SMITH, Librarian

## AGRICULTURE

ANDREW BOSS, Agriculture

C. P. BULL, B.Agr., Assistant in Agriculture

A. D. WILSON, B.S. in Ag., Assistant in Agriculture

L. B. BASSETT, Farm Machinery

T. P. COOPER, B. S. in Agr., Assistant in Agriculture

## AGRICULTURAL CHEMISTRY

HARRY SNYDER, B.S., Agricultural Chemistry

J. A. HUMMEL, B. Agr., Assistant in Agricultural Chemistry

AGNES ERICSON, Assistant in Agricultural Chemistry

CORNELIA KENNEDY, B.A., Assistant in Agricultural Chemistry

WALTER L. BADGER, Assistant in Agricultural Chemistry

## AGRICULTURAL ENGINEERING AND PHYSICS

J. T. STEWART, B.S., Agricultural Engineering, Physics

A. L. EWING, M.S., Assistant in Agricultural Physics

## ANIMAL HUSBANDRY

ANDREW BOSS, Animal Husbandry

J. M. DREW, Poultry

D. A. GAUMNITZ, M.Agr., Assistant in Animal Husbandry

J. L. EDMUNDS, B.Sc., in Agr., Assistant in Animal Husbandry

W. F. HANDSCHIN, Assistant in Animal Husbandry

DAIRY HUSBANDRY

T. L. HAECKER, Dairy Husbandry, Animal Nutrition  
 A. J. MCGUIRE, B.Agr., Assistant in Dairying  
 GEO. P. GROUT, B.S. in Agr., Assistant in Dairy Husbandry  
 E. K. SLATER, Assistant in Dairy Husbandry

DOMESTIC ART

MARGARET J. BLAIR, Sewing, Household Art  
 EDITH STAPLES, Assistant in Sewing  
 AVIS HALL, Assistant in Sewing  
 GRETA SMITH, Assistant in Sewing

DOMESTIC SCIENCE

JUNIATA L. SHEPPERD, M.A., Cooking, Laundering, Home Economics  
 MARY L. BULL, Assistant in Cooking, Laundering  
 MAY McDONALD, B.S., in Home Economics, Assistant in Cooking

ENGLISH

R. C. LANSING, M. A., English  
 ESTELLE COOK, Assistant in English  
 ETHEL E. BUSH, B.A., Assistant in English

ENTOMOLOGY AND ZOOLOGY

F. L. WASHBURN, A.M., Zoology, Entomology  
 A. G. RUGGLES, M.A., Assistant in Entomology  
 H. J. FRANKLIN, B.S., Ph.D., Assistant in Entomology

FARM STRUCTURES AND FARM MECHANICS

WM. BOSS, Farm Structures, Farm Mechanics  
 J. M. DREW, Blacksmithing  
 A. M. BULL, Drawing, Farm Buildings  
 H. J. THOM, Assistant in Blacksmithing  
 THOS. SEWALL, Assistant in Drawing  
 H. B. WHITE, B.S. in Agr., Assistant in Carpentry  
 J. L. MOWRY, Assistant in Mechincal Practicums

## HORTICULTURE AND FORESTRY

S. B. GREEN, B.S., Horticulture, Forestry  
LEROY CADY, B.S., in Agr., Assistant in Horticulture  
E. G. CHEYNEY, A.B., Assistant in Forestry  
A. R. KOHLER, B.S.A., Assistant in Vegetable Gardening  
J. P. WENTLING, M.A., Assistant in Forestry

## SOILS

HARRY SNYDER, B.S., Soils  
W. H. FRAZIER, B.S., Assistant in Soils  
A. D. WILHOIT, M.A., Assistant in Soils

## VEGETABLE PATHOLOGY AND BOTANY

E. M. FREEMAN, Ph.D., Vegetable Pathology, Botany  
W. L. OSWALD, Assistant in Agricultural Botany

## VETERINARY SCIENCE

M. H. REYNOLDS, M.D., D.V.M., Veterinary Science  
C. C. LIPP, D.V.M., Comparative Physiology  
C. A. PYLE, B.S., D.V.M., Assistant in Veterinary Science

## SCHOOL

J. A. Vye, Farm Accounts  
D. D. Mayne, Practicums  
GRACE B. WHITRIDGE, Physical Training  
KARL A. MACHETANZ, B.A., History, Director of Gymnasium  
FANNIE C. BOUTELLE, Social Culture  
D. B. HOWELL, Ph.B., Mathematics  
EDWARD SIGERFOOS, Ph.B., Capt. 5th U. S. Infantry, Military Science  
and Tactics  
MARTHA B. MOORHEAD, M.D., Lecturer in Domestic Hygiene  
MARY L. COFFIN, Music  
GERTRUDE V. COLLINS, Assistant in Farm Accounts  
H. B. ROE, B.S., in Eng., Mathematics



## Committees, School of Agriculture

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LIBRARY: Mayne Reynolds, Snyder, Smith, Green.

CATALOG: Vye, Snyder, Drew.

MILITARY DRILL: Sigerfoos, Green, Haecker

ENTERTAINMENT: Mayne, Boutelle, A. Boss.

HEALTH: Reynolds, Mayne, Boutelle, Washburn.

DAIRY SCHOOL: Haecker, Wm. Boss, Snyder.

SHORT COURSE FOR FARMERS: Mayne, A. Boss, Green.

AUDITING: Reynolds, Hummel.

ATHLETICS: Green, Mayne, Machetanz.

# The School of Agriculture

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## TIME OF OPENING

The School of Agriculture will open Monday, October 4th, 1909, and close March 23rd, 1910. The fall term closes at 4:30 p. m., Thursday, December 23rd, and the winter term begins Monday, January 3rd, 1910.

Instruction begins promptly at the opening of each term, and students should be present the first day of the term and remain until the close of the term.

Students are advised to correspond with the registrar of the school, J. M. Drew, University Farm, St. Paul, Minnesota, prior to coming to the institution and to make the necessary preliminary arrangements for registration. Students registered in the fall term will not be received after the second day of the winter term, unless a reasonable excuse is presented for the delay.

## LOCATION

The School of Agriculture is located on University Farm, St. Paul, Minnesota, about midway between the business portions of the cities of St. Paul and Minneapolis. Directions for reaching the school are given on page 9. The School of Agriculture is a part of the University of Minnesota and is governed by the University Board of Regents.

## PURPOSE

The School of Agriculture was organized in 1888 with the object of giving a practical education to the young men and women who are unable to pursue the full college course in agriculture. It offers a practical course of study designed to fit young men and young women for successful farm life, and aims to give to its students the necessary preparation for useful citizenship.

## COURSE OF STUDY

The course of study offered covers a wide range of subjects and is largely technical in character, but provision is made for some instruction in English and mathematics. The course is briefly outlined on pages 15

and 16. Instruction is given in the work shops, laboratories, barns and fields, as well as in the class room. The course requires three winters of six months each for completion, and is co-educational. Much of the work is taken in common by the young men and the young women. Some of the subjects, such as blacksmithing, carpentry, field work, handling grain and machinery are taken by the young men, while the young women pursue cooking, sewing, laundering and household art. The methods of instruction tend to educate students toward the farm instead of away from it, to develop in them a love for farm life by showing them its possibilities. In this respect the school has been very successful as over 72 per cent of its graduates continue agricultural pursuits.

### HOW TO GET TO THE SCHOOL

Check all baggage to St. Paul or Minneapolis and bring checks to the school.

A charge of 25 cents is made by the school teams for transporting trunks at the opening of the school. No charge is made for the return of the baggage, at the close of school, provided it is ready to go on the days assigned.

Monday and Tuesday, October 4th and 5th, members of the Y. M. C. A., wearing lettered badges, will be at the Union Station in St. Paul, and at the Union, Milwaukee, Great Western, Soo and St. Louis Stations in Minneapolis to meet and direct new students. Take the Como-Harriet or Como-Hopkins car from either St. Paul or Minneapolis and get off at Commonwealth avenue.

### ADMISSION

All male students are required to have had six months' farm practice before entrance.

Parents are advised not to send pupils under seventeen years of age.

Students who have completed eighth grade work in the common schools are admitted without examination.

Applicants for admission who do not have state certificates or county diplomas showing completion of eighth grade work should send to the registrar for certificates of admission which, when properly filled out by former teachers or superintendents, will be accepted in place of entrance examinations.

Applicants whose home schools do not afford complete instruction in the common branches may be admitted with not more than two conditions which must be removed according to instructions given the student upon admission.

Students from city or grade schools will not be admitted before finishing eighth grade work nor until their former school records have

been passed upon by the registrar. These records must be presented at least three weeks prior to the opening of the school.

State High School Board Certificates are accepted for work in English, physiology, algebra, geometry and civics, or credits of 75 per cent or more received on State Teacher's examinations.

## HOME LIFE ON THE CAMPUS

The life of the students while attending the School of Agriculture is subject to supervision.

The home life of each student is carefully guarded, and everything done to promote a healthful, moral atmosphere.

The use of tobacco and spirituous liquors of all kinds is strictly forbidden. No person will be admitted as a student who is known to have the cigarette habit.

Upon entrance students are provided with a copy of the rules.

Any one not in accord with these restrictions and not willing to lend a hand toward a strong moral growth should not come to the School of Agriculture.

## CLASSIFICATION OF STUDENTS

No student with incomplete C or preparatory work, or more than one incomplete B subject will be classified as an A, excepting high school graduates.

No student with incomplete preparatory work, or more than one incomplete C subject, excepting high school graduates, will be classified as a B.

No student with incomplete C or preparatory work will be made a commissioned military officer.

## STUDENTS IN DORMITORIES

The Principal of the School of Agriculture has charge of the boys in their dormitory and social life, and the Preceptress has charge of the girls in their dormitory and social life, under such regulations as they may make.

From 8:15 a. m. to 4:30 p. m. students not at recitation or chapel are expected to be in their rooms or the library studying or reading, also after 7 in the evening.

The rooms shall at all times be quiet, especially in the evening, so that no student may be disturbed.

The cadet officers shall make daily inspection of the boys' dormitories, under proper supervision of the instructors.



## HOLIDAYS

On Lincoln's birthday, February 12th, the regular classes of the last two periods in the forenoon will be omitted and a suitable program substituted.

Washington's birthday, February 22nd, will be observed by appropriate exercises.

On Thanksgiving day no classes will be held, but school will continue as usual on Friday and Saturday following.

## REQUIREMENTS FOR GRADUATION

First—The completion of the prescribed course of study with an honorable standing in deportment.

Second—An essay of not less than one thousand words upon a topic connected with agriculture or home economics.

Third—For young men, a practical experience in field work at the University Farm or elsewhere, as shall appear in reports received from responsible sources.

## FEES

With an exception of an entrance fee of \$5 to residents of Minnesota and \$10 to non residents, the school makes no charges.

## EXPENSES

The necessary expenses for the year do not exceed \$85. This amount does not include the cost of the required military suit for the young men, traveling and personal expense.

The cost to the student for board, heat, light and laundry is the actual cost of maintaining the table (including management), and caring for the buildings. This has not exceeded \$3 per week. Each month's board is paid in advance. The buildings are all lighted by electric lights and warmed by steam. The sleeping rooms are each furnished with a bedstead, mattress, dressing bureau, chairs and table.

No deduction in charge is made for absence of less than five days. If students are compelled to be absent for that length of time they are allowed half rates if they make arrangements before leaving.

Text-books are furnished at a rental of \$2 per year to students who do not desire to purchase.

A gymnasium fee of 25 cents per term is charged all students.

Each student is required to pay for breakage of apparatus used in practical work.

A competent nurse is kept on the ground to care for the sick. To meet this expense each student pays \$1 per term.

For the purpose of supplying, calcimining and painting the sleeping rooms, a reserve fund is created by assessing each one occupying them \$2.00.

A deposit of \$5 is required of each student, as a guaranty for the return of all books and other articles borrowed. This deposit is not returned until the student severs his connection with the school.

On entering school the student makes a payment of \$5 entrance fee; \$12 board; \$1 book rent and reading room; 25 cents gymnasium fee; \$1 maintaining nurse; \$2 reserve fund; \$5 deposit; total \$26.25.

All male students are required to provide themselves with the prescribed uniform, which consists of navy blue blouse, trousers and cap, and is as neat and economical a dress as the student can obtain. The suit complete, to measure is furnished under special contract for \$14.50.

Each student provides four sheets, one pair of blankets, one quilt, one bed spread, one pillow, three pillow cases, towels, napkins, comb and brushes, one glass tumbler, and one teaspoon.

An assignment of rooms will be made at 9 a. m., March 19th, which will hold good until 8 p. m., the first day of the following school year. Students wishing to retain their rooms, after vacation, must be present when the second term opens, or pay one-half the price of board and room for the time they are late. Students arriving after the dormitories are filled are compelled to find rooms elsewhere, but are allowed a rebate of \$3 per month.

## HOSPITAL FUND

The Hospital Fund will be expended under the general direction of the Health Committee.


This fund insures for those contributing to it, the care of regular nurses and such medicines and materials as the regular nurses may use.

It does not provide medical treatment by physician.

It does not provide hospital expense of students rooming off the campus or away from the institution. Students rooming off the campus are not expected to contribute to this fund.

It does not provide for special nurses if such be required by reason of serious or long continued illness except as provided for in the following rule:

### RULE

 Adopted by the Health Committee March 9, 1909.

"After usual and necessary running expenses connected with the Hospital Fund have been taken care of, any available balance may be used for paying special nurses or other extraordinary expenses. Any

balance still due such special nurses shall be paid by students requiring such extra help and pro-rated according to the number of days attendance for each.

"A dispensary fee of \$.25 for each office service by nurses will be collected from those who have not contributed to the hospital fund.

"The regular hospital fee is collected from dining room help the same as for students and this help is then entitled to nurse care on the same basis as students."

### LIBRARY

The Agricultural Library is well equipped for supplying the needs of both undergraduate and graduate students. It contains nearly 15,000 volumes of general and technical literature, government reports, etc., besides 4000 unbound pamphlets, bulletins, and reports. The general subject and author card index and the index of publications of the state experiment stations are always at the disposal of all students to aid them in locating the various sources of information which the library affords.

There are complete sets of all the standard encyclopedias and dictionaries and files of over 225 popular and technical magazines and periodicals.

The librarian and her assistants are always ready and glad to give whatever assistance they can, both to those interested in special research work and to those doing regular reference work in connection with their classes. All those wishing to read or study are made welcome and given whatever privileges the library can provide.

### ZOOLOGICAL MUSEUM

This is in the third story of the Main building and connecting with the lecture room of the entomologist. It contains, one of the finest collections of birds in the Northwest, a large series of mammals, shells, anatomical models, etc., all used in class instruction. One case is given up to models of injurious insects and a collection of spray pumps, nozzels, etc., showing the various makes on the market. Another case is devoted to a beautiful series of Minnesota fishes, reptiles and amphibians, and on two sides of the large room devoted to museum purposes are cases containing thousands of pinned insects. Friends of the institution who are inclined to donate zoological specimens may rest assured that they will be properly installed and given the best of care.

### STUDENTS' DEBATING SOCIETIES

Students are urged to unite with one of the literary societies of the school for both pleasure and profit. It affords a training in conducting meetings, parliamentary laws, and public speaking obtainable in no other

way. Credit is given for the work as it is under the supervision of one of the instructors in the English department.

### LECTURE COURSE

During the school year, a lecture and entertainment course, usually consisting of six lectures and concerts, is given in the chapel at a cost of one dollar for the series for reserved seats. These entertainments are strictly high grade, and furnish a pleasant relaxation from school work, as well as mental stimulus.

The following program, which was provided during the past year, shows the general character of the entertainments:

November 6,	A Russian Nobleman's Story of Siberian Exile and Escape, Count Alexander M. Lockwitzky
November 13,	Music, The Dunbar Company
December 18,	Character Studies from Life, John B. Ratto
January 8,	Lecture Recital, Paul M. Pearson
January 22,	The Story of LeClaire, N. O. Nelson
February 12,	Music, Hruby Brothers
March 13,	Violin Recital, Alexander Petschnikoff

### STUDENTS' CHRISTIAN ASSOCIATIONS

The Young Men's and the Young Women's Christian Associations have for their objects, social fellowship and moral and spiritual development. To this end two receptions are held each year, and Bible classes are held Sunday mornings at 8:30. A general religious service is held each Sunday at 3 p. m., and a mid-week prayer meeting each Wednesday, at 6:30 p. m. The associations are non-sectarian, so that all students may find in them an opportunity for Christian activity and mutual helpfulness.



# Course of Study

## FIRST (C) YEAR

### FIRST TERM

Agricultural botany [4]

Drawing [2]

Music [2]

Farm Mathematics [5]

\*Blacksmithing [2]

\*Carpentry [2]

Military Drill [2]

Agriculture [3]

Gymnasium [2]

\*Practicums [2]

or

\*Cooking [2]

Physical training [2]

\*Sewing [2]

Social culture [1]

Field agriculture [3]

### SECOND TERM

Agricultural botany [5]

English [5]

Music or literary society work [2]

Comparative physiology [5]

Study of breeds [5]

\*Carpentry [2]

\*Drawing (farm buildings) [2]

\*Blacksmithing [2]

Military drill [2]

Gynasium [2]

\*Practicums [2]

or

\*Laundering [2]

\*Drawing farm houses [2]

Physical training [2]

\*Farm accounts [2]

## SECOND (B) YEAR

### FIRST TERM

English [2]

Agricultural physics [5]

Dairy chemistry [2]

\*Dairy husbandry [2½]

{ Dairy lectures

{ Dairy practice

{ Dairy breeds

Fruit growing [3]

Music [2]

\*Farm Accounts [4]

\*Stock judging [1]

Breeding [2]

Military drill [2]

Gynasium [1]

or

\*Farm Accounts [2]

\*Cooking [2]

Household art [1]

Physical training [2]

\*Sewing [2]

## SECOND TERM

	English [2]	
	Agricultural chemistry [5]	
	*Dairy husbandry [2½]	Dairy stock lectures Dairy practice Dairy feeding
	Music [2]	
	Agricultural physics [5]	
	Vegetable gardening [3]	
Field crops [5]	}	or
Military drill [2]		
Gymnasium [1]		
		*Cooking [2] Home management [1] Physical training [2] *Sewing [2]

## THIRD (A) YEAR

## FIRST TERM

	Agricultural chemistry [7]	
	Forestry [3]	
	Zoology [3]	
	Poultry [3]	
	Algebra [5]	
Handling grain & machinery [1]	}	or
*Veterinary science [2½]		
Gymnasium [1]		
Music or military drill [2]		
		*Cooking [2] *Sewing [2] Music [2] Home nursing optional

## SECOND TERM

	Civics or English [4]	
	Plant propagation [3]	
	Entomology and insect collection [3]	
	†Algebra [5]	
Dressing and curing meats [1]	}	or
*Stock judging [1]		
Feeding [3]		
Soils and fertilizers [5]		
*Veterinary science [2½]		
		Meats [1] Home economy [1] *Cooking [3] Domestic chemistry [3] *Sewing [3] Domestic hygiene [1]

\*Figures in brackets indicate the number of periods per week in which the subject is pursued. All work in subjects marked thus \* extends through double time in the daily program.

† Required of those expecting to enter the College of Agriculture.

## VACATION WORK

It is essential that the student should do some work of a practical nature during the vacations following the first and second school years respectively. Students will be given a credit for this work just the same

as for other school work. Blanks giving an outline of the work in detail and blanks for certification are furnished to all students.

It is expected that all the boys in the school will devote their vacations to actual farm work, or to some form of agricultural work.

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## ASSEMBLY

On each school day at 11:40 a. m., the students assemble in the chapel. After the opening exercises brief talks are given by the principal, members of the faculty, or invited guests.

During the year the list of speakers include prominent state and national officials, business men, particularly those connected with the agricultural industries, professional men, prominent clergymen of all denominations, educators from other institutions, and successful farmers. It has been found that this plan gives to the students an opportunity to hear men of prominence discuss a wide range of topics, many of which relate to rural and agricultural problems.

Members of the graduating class at times present essays, and discuss topics as assigned.

# Courses of Instruction

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## AGRICULTURAL BOTANY

This course consists principally of a study of the flowering plants. The practical side of the subject is emphasized by the study of the plants usually found on the farm. Some work is done in the greenhouse which enables the students to see more clearly the functions and different parts of the plant. This course includes a botanical study of weeds found on the farm and the botanical features concerned in methods of eradication. Determination of weed seeds found in grain and grass mixtures is also a part of this course. Plant diseases such as rusts, smuts potato diseases, etc., are studied and the best preventive methods are discussed. Some instruction is given in the use of the compound microscope.

## AGRICULTURAL CHEMISTRY

In agriculture chemistry one term is given to the study of the elements and compounds which are or the most importance in agriculture. This work is planned to prepare the student for intelligent study of the subject of the chemistry of foods, soils and fertilizers, and at the same time to familiarize him with the more important chemical changes which take place in every-day life. Laboratory practice forms a prominent feature of the work. In the chemistry of foods, the composition of plant and animal bodies, the chemistry of the plant and of its food and growth, the chemistry of animal nutrition, digestibility and value of foods, and the laws of governing the economic uses of foods, are some of the subjects considered. The composition and the utilization of farm crops for food purposes, and the application of the principles of chemistry to plant and animal life, form the basis of this work.

## AGRICULTURAL PHYSICS

In this department it is the aim to enlist the student's interest in a more keen appreciation of the principles that underlie the practices of his vocation. To this end the facts with which he is already somewhat familiar are used to reach the fundamental law. For example, from his knowledge of the relation of weight to bulk in grains, soils and water, he is led to a knowledge of volume, mass, density, weight, force, draft, specific gravity, and fluid pressure. In the laboratory he makes definite determinations along these lines. Likewise the somewhat vague and indefinite notions the young people have from their use of pulleys, eveners and other farm machinery, form fitting stepping stones to definite mathematical results readily reached by them under proper guidance.

The varied questions of soil physics, soil formation, the movements of water and air through soil, soil temperatures, soil grains and granules, and pore space, are matters studied from the practical side and used as avenues to far reaching laws.

## AGRICULTURE

It is proposed in teaching this subject to cover the elementary principles governing soils, and field and farm management. The work covers the origin, formation, and cultivation of soils; the movement and control of soil moisture;



selecting and planning farms; subdividing fields; drainage; irrigation; roads; fences; buildings; water supply; groves and wind breaks; farm life; the relations of science to agriculture; a general consideration of farming as a business; and methods of farming.

### ELEMENTARY ALGEBRA

Beginning algebra is offered throughout the senior year, required of all students intending to enter college and optional for others. This work covers Well's New Higher Algebra or equivalent texts through simple equations of one unknown quantity. Special attention is given to literal notation, negative numbers, factoring, fractions, and the simple equation.

### BLACKSMITHING

The students are instructed in the management of the forge and fire, and in bending, shaping, and welding iron and steel. They are required to make links, rings, hooks, bolts, clevises, whiffletree-irons, tongs, cold-chisels, punches, in short, become familiar with all the operations necessary to enable them to do their own repair work, when they return to the farm. Particular attention is given to rapid and accurate welding and to the shaping and tempering of steel tools. The forges used are such as any farmer can make for himself, and each student is taught to make his own tools, so that he will be able to furnish his shop with very little outlay.

### BREEDING

Students receive instruction in the principles that govern breeding, on the influences that affect heredity and in the care and management of breeding stock. Pedigree receives careful consideration, and each student is required to make out pedigrees of two or more pure bred animals. They are also required to become familiar with methods of keeping live stock records of all kinds.

### CARPENTRY

Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction,—framing, laying out rafters, stairways, estimating building material, painting, etc. In the carpenter shop students are required to make such exercises as will give them some practice in using carpenter tools. They are required to make mortise joints, splices, drawing boards, hammer handles, eveners, cupboards, etc.

Each student is required to file his own saws, sharpen his planes, chisels, etc.

### CIVICS

During the last term of the course students receive instruction in this science, and graduate with a good understanding of the origin, necessity, nature, and various forms of government, and the machinery employed to carry on public works, establish justice and provide for the common defense; of the organization and management of local institutions—the town, the village, the city and the county; the manner in which states are created and the affairs administered; the three departments—legislative, judicial, and executive—and the functions of each; the interdependence of the state and its citizens, as well as the powers and obligations of each, by due attention to which the state may be strengthened and the condition of its citizens ameliorated.

The relations of the state to the general government, the constitution and the power it confers and the provisions for amendments, are taught. The more im-

portant principles of commercial law, including contracts, agency, partnership, corporations, and commercial paper, receive attention. Instruction is also given in the United States method of surveying public lands.

### COMPARATIVE PHYSIOLOGY

During the first year students take one term of applied physiology. This is an effort to connect technical physiology with the necessities of every day life. The work includes a study of the general plan and structure of the body and the various individual tissues of which is composed; also sources of heat and energy, digestion, and the relation of food materials to the various tissues of the body. Considerable attention is given to diseased and innutritious foods, food adulteration and naricotics. The circulation is studied with special reference to the relation of the blood and lymph to tissue nutrition and tissue waste.

Accidents, including poisoning, are studied for the purpose of giving a practical knowledge of what to do in emergencies. Considerable attention is given to the subject of clothing, the various materials in use being considered with reference to fitness for special purposes. Some time is also given to the study of common physiology, of the organs of circulation, digestion, respiration, nervous system, and the relations of bacteria to the common diseases, especially such diseases as consumption, typhoid fever, etc. A brief study is also given to the subject of digestion in the lower animals.

The class work is illustrated by means of large charts, skeletons, manikins, and dissection. Important points of difference between human and animal physiology are pointed out in preparation for the third year's work in the veterinary class. Matters of home and personal hygiene are interwoven with the physiology work.

### COOKING

Cooking extends through five terms of the curriculum. The subjects covered in each term are as stated below:

First term, C year: Furniture and equipment needed in a home kitchen; best methods of managing kitchen work, caring for kitchen and dining room; utensils, furniture, etc.; the place of measuring and weighing in cookery; the preparation and serving of vegetables, cereals and bread.

First term, B year: Cooking is again taken up, the special topics being preservation of fruits and vegetables by canning, preserving, pickling and jelly making. The selection, preparation, and serving of meats of all kinds is also considered. A sufficient amount of practical work is given in each case to illustrate the principles brought out. A special study of table service is begun during this term and extends through the year, a practice dinner being given by a portion of the class in the class dining room each month.

Second term, B year: Eggs are considered as to selection, preservation, food value, different ways of cooking and serving. The preparation and serving of soups and beverages is considered together with their food value. The subject of salads is considered in a similar way.

First term, A year: This is devoted to the marketing and care of food. The preparation and serving of dairy foods, and made over dishes and dishes for invalids receive special attention.

Second term, A year: This devoted to the preparation and serving of desserts and to the study of food rations, dietaries, bills of fare, confections, etc. A free use is made of the U. S. Bulletins during the year in the hope of arousing a greater interest in the food question.

## DAIRY CHEMISTRY

The chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese, and the application of these principles to the production of milk and its products form the basis of this work.

## DAIRY HUSBANDRY

Farm dairy lectures—A course of lectures is given in farm dairying, giving instruction in the care of milk and utensils, explaining the principles involved in creaming milk by the gravity and centrifugal process and giving full instruction in regard to running farm separators and the manufacture of butter and cheese in the farm dairy.

During the last half of the first term students receive instruction in regard to the characteristics of the various breeds of dairy cattle, their origin and comparative adaptability for the dairy. Lectures are given upon the points desirable in animals intended for the dairy. The students have practice work in judging dairy stock.

During the second term lectures are given covering both the scientific and practical phases underlying the principles of feeding. Practice work is given in compounding rations and estimating the comparative value of foods stuffs.

Commencing the first Tuesday in February, lectures in bacteriology are given the girls in place of dairy feeding. This work treats in an elementary way the subjects of bacteria, yeasts, and molds in the home. It is the purpose of this course to familiarize the young women with the growth and character of fungi commonly met in household and dairy management. A microscopic examination and study of the more common forms of fungi is made and special stress is laid on the practical application of the subject to the home.

Dairy practice.—Students receive instruction in the most advanced methods of creaming milk, ripening cream, churning, working and packing butter, the manufacture of sweet curd cheese, and measuring the value of milk by the Babcock test and lactometer. This practice work begins the third week of the first term and continues through the school year.

## DOMESTIC CHEMISTRY

The composition of human foods and their combinations to form balanced rations, dietary studies of families, cost and value of foods, chemical changes and losses in the cooking and preparation of foods, cereal food products, animal food products, fruits, adulterations of foods and their detection, fuels, soaps, disinfectants, dye stuffs and colors, composition of common household utensils the household water supply, preparation of home-made baking powders, bakers' chemicals, the composition, food value and characteristics of tea, coffee, chocolate, cocoa, molasses, honey, vinegar, spices, flavors, extracts, etc., the grading and testing of wheat flour, the chemistry of bread making and household sanitation, form the essential parts of this work.

Laboratory practice is given in study of the composition and detecting adulteration of different foods, such as milk, cream, butter, oleomargarine, lard, cheese, coffee, tea, vinegar, catsups, jellies, flavors and extracts, baking powders, cereal breakfast foods, and flour. The aim of this work is to give students an idea of composition, uses and value of food materials, and the part chemistry takes in sanitation and household affairs.

## DOMESTIC HYGIENE

Several lectures by a physician will be given upon maidenhood maternity and infancy. These special lectures will be supplemented by the regular lectures

which consider the health of the family as dependent upon pure food, pure water personal cleanliness, and proper habits, as well as upon heredity. The aim is to impress the truth that a knowledge of and obedience to the laws of hygiene are essential to the preservation as well as the restoration of health.

### DRAWING

The student is taught the practical value of drawing for the purpose of designing and arranging buildings, machinery, etc. He makes drawings of the shop exercises, then works from his own drawings, thereby learning the application.

Designs are made for dwellings, barns, outbuildings, and machinery. As practical subjects for their designs, students are requested to bring from home data for plans of buildings needed on their farms. Estimates are made of the amount of material required and cost of construction.

### DRESSING AND CURING MEATS

The instruction given the boys consists of demonstration lectures on the preparation of meat for farm use. They are required in addition to take two weeks' practice in dressing, cutting, and curing such meat as is likely to be used on the farm. Work is also given them in selecting and judging fat stock and in judging dressed meats.

### ENGLISH

Applicants for admission to the school who are deficient in the knowledge of the inflections of the parts of speech, the classification of phrases and clauses, and case constructions, are required to make up the deficiency by a course in grammar for which no school credit will be given.

"C" Class. In the first year, English is studied five hours a week for one term. Three hours are given to constructive work with almost daily practice in writing short exercises based on Mayne's "Modern Business English." Two hours are given to the interpretation and analysis of literature.

"B" Class. In the second year, English is studied two hours a week for two terms. The writing of weekly themes and the study of the forms of discourse constitute the work.

Intermediate English is required of those who intend to enter any of the colleges. It consists of a study of masterpieces necessary for college entrance, the history of English literature, and considerable writing on subjects in connection. It is given five hours a week for two terms.

"A" Class. In the third year an optional course in rhetoric is offered in the second term for four hours a week. The object of the training is fluency and correctness in written and oral English.

### ENTOMOLOGY AND ZOOLOGY

The class in entomology receives instruction of a practical nature. The course is divided as follows:

Classification of insects, habits and life histories of injurious forms with special attention to insect pests found in Minnesota. The nature of the different insecticides and methods of application are discussed. The student spends some time in becoming acquainted with the appearance and habits of beneficial insects. Each student must collect fifty insects representing at least twenty-five different kinds.

The four-footed pests of the farm—rabbits, gophers, squirrels, etc., as well as injurious and beneficial birds, are also studied.



## FARM ACCOUNTS

The work in accounts is applied to the transactions which the student meets in the various duties of the farm. He is taught to keep his accounts, that he may know at any time the profit or loss of any department of his business, and is thus enabled to plan intelligently.

## FARM ARITHMETIC

Instruction in this subject consists of the application of its principles to all kinds of farm problems where measurements of material, extension, capacity, etc., are required. The student is prepared also to handle with ease the mathematics of the technical courses in the school.

## FEEDING

The principles of feeding as applied to the production of horses, beef cattle, sheep and swine are taught. Special attention is given to the choice and preparation of food for animals during different periods of growth and during the time they are used for breeding purposes, and to summer feeding and pasturage. Practice is given in compounding rations that will include in the best manner the food stuffs commonly produced on the farm. Practical lessons in feeding are given at the barns under the supervision of an experienced feeder. Each student thus learns the requirements of each class of stock.

## FIELD AGRICULTURE

This work consists of a study of those portions of geology relating to soil formation; effect of the glaciers on the soils of Minnesota; origin of soils in the various agricultural regions of Minnesota; classification of soils; soil moisture and soil tillage; land areas and the planning of fields and farms; the classes of field crops as grain, grass, and cultivated crops; the relation of these crops to each other in a systematic rotation and in their relation to soil fertility; the origin, distribution, and uses of cereal crops and other field crops.

## FIELD CROPS

Students are admitted to this subject after having finished the work of agriculture and receive instruction as follows:

Crop rotations, farm management, and planning farms under various conditions; production and care of farm manures and green manure crops; fertility as related to weeds, crop production and profits; preparation of land; planting, cultivating, harvesting, storing, and marketing of grains, roots, fiber, sugar, grass, and other forage crops; meadows and pastures; treatment of field crop diseases; selecting, breeding, and judging seed.

## FORESTRY

Forestry includes the consideration of the formation and care of wind breaks and shelter belts; the laying out and planting of home grounds; discussion of the hardiness, habits, and value of our native and introduced trees, and the methods of propagating them.

## FRUIT GROWING

Fruit growing is taught with reference to raising fruit for market and in the home garden.

## GYMNASIUM WORK

The gymnasium is a large, well lighted, two story brick building. It is well supplied with heavy apparatus for general gymnastic and athletic exercises, together with such appliances as are necessary for the development of a symmetrical body. Besides being fitted up with the finest apparatus, it possesses space and equipment for sprinting, pole vaulting, hurdling, high and broad jumping, shot putting, etc.

Class work in physical training is required of all undergraduate young men not excused on account of physical disability. Courses are offered on the heavy apparatus, in corrective work, class drills, and athletic training. In addition to the regular class drill, a certain part of which consists of training in athletic sports, the school is represented by a strong basket ball team, a track athletic team, hand ball team, and an indoor tennis team.

## HANDLING GRAINS AND MACHINERY

Practical suggestions for the best methods of harvesting, shocking, stacking and storing cereal grains; adaptation of the various kinds of machinery with reference to the soil, weeds and seasons; adjustment with special reference to durability, convenience in manipulation, etc., are given.

## HOME ECONOMY

The lectures in home economy are a study not only of the just proportion between expenditure and income, but of definite proportion in the expenditures made for existence, comfort, culture, and philanthropy. A study is made of the sources of income, especially of the income from the farm in the form of house, food, and luxuries; the purchase of necessities such as household stores and furnishings is considered from the standpoint of the suitable, and desirability shown of saving something to be used in securing things, which promote culture and comfort. The relation of cash and credit to cost is also considered. Attention is given to saving and forms of investment, a book account, and the use of a check book. Students are required to submit an account setting forth in detail the use of a certain named income expended in the support of a family for one year, embracing not only every item of necessary home expense, but also an outlay made for travel, luxuries, accident, sickness, or other emergencies. The habit of keeping a household account is calculated to strengthen the judgment in the wise use of money.

## HOME MANAGEMENT

This subject includes both housekeeping and home-making, and the instruction is based on the belief that housekeeping is a business as important as it is difficult and that home-making is the noblest form of human endeavor. The care of the house and household belongings, of the food, utensils, plumbing, etc., as well as the general ordering of family life, are considered in their relation to an adequate plan for home management. To start the student in the right way of becoming mistress of the business of housekeeping and home-making is the end sought. The practical benefit to be derived from the knowledge students gain in the cookery, sewing, dairy, laundry, and other classes, is emphasized and shown in its relation to an adequate plan for the daily program for the home.

## HOUSEHOLD ART

Lectures are given upon house and grounds, noting the distinctive character of the country home; the sanitary conditions involved in the selection of the site of

the house, also the influence of the outlook; an elementary study of architecture in connection with planning a house which will provide "a place for everything" required in housekeeping operations and family life; instruction in the fundamental value of color, form, and design' training the taste and emphasizing the laws of hygiene that should influence the selection of materials and styles in the finishings and furnishings of the house.

### LAUNDERING

Second term, C. year: The aim is to give the students a knowledge of the best means of cleansing all fabrics with little injury to the cloth or color. Approved methods of cleansing by the use of chemicals, as removing grease spots, stains, etc., are given.

### LITERARY SOCIETY WORK

Any student belonging to a recognized literary society of the school may receive credit in the course of study for the work done therein by registering at the beginning of the term, and submitting to the teacher in English all essays to be read by such student before the literary society and rehearsing to said instructor all essays readings, or recitations with a view to correct pronunciation, expression, etc.

### MEATS

The instruction given to the girls in the subject of meats pertains to the selection and value of different classes of meat, and to the best methods of curing and preserving.

### MILITARY DRILL

Under the provisions of the Act of Congress of 1862, establishing the "Land Grant Colleges" of the United States, instruction in Military Science and Tactics is required to be given at all colleges which are its beneficiaries. For this purpose the United States Government furnishes the Department of Agriculture with the necessary arms and equipments, and details an officer of the regular army to take charge of military science and tactics.

All male students of classes B. and C. not physically unfit are required to attend military drill. For the A. Class, drill is an elective.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor, and obedience to lawful authority, as well as to familiarize students with battalion manoeuvres, guards, and the theoretical and practical use of firearms.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment, and able to pass a creditable examination in drill regulations.

In general, the officers are selected from the "A" class; sergeants and corporals from the "B" class.

### MUSIC

Instruction in this department takes an elementary theory, sight singing and music history. The course is planned to give the students a basis for musical appreciation and culture, as well as a practical knowledge of musical forms and terms. Special attention is given to habits of breath control and enunciation of words, and a thorough system of solfeggio is employed.

For students whose voices and training will admit them, there is offered a chorus class, consisting of a mixed chorus, a women's chorus, and a male chorus. This offers special advantages for musical development and experience.

A student orchestra is maintained which assists in public exercises given by the school.

### PHYSICAL TRAINING

The work done in this department aims at symmetry, co-ordination, and control rather than mere physical strength. It is planned to improve the functional activity of the body and to counteract and correct tendencies toward incorrect development, especially those resulting from the artificial life of civilization. The work of the beginning class is free hand, based upon Swedish principles, and directed especially to deep breathing, correct carriage and posture. The work of the advanced class includes light apparatus and aesthetic movements for grace and suppleness in action. Vigorous games are given to both classes.

### PLANT PROPAGATION

In this subject the principles underlying the development of cultivated varieties of plants and seed testing are taught; also the propagation of plants by seed, cuttings, grafting, and budding. The work of the class room is illustrated by the orchards, nurseries, forest plantations, gardens, and greenhouses on the grounds of the experiment station, and by visits to commercial nurseries and greenhouses near by.

### POULTRY

The instruction in this subject will include the following topics: History and characteristics in the leading breeds of poultry; breeding, rearing, and management of fowls for eggs and for the market; planning building, and arrangement of poultry houses; managing incubators and brooders. A model poultry house, containing pens of the most improved breeds, incubator-cellar, work-room, etc., has been provided, where experimental work and practical instruction are carried on.

### PRACTICUMS

During the first year the young men spend four hours each week in a series of lessons and exercises in the barns and fields, taking up such practical lines of work as land surveying, laying tile drains, building fence, setting up farm machinery, soldering, pipe-fitting, splicing rope, making rope halters, cement work, etc.

### SEWING

Instruction is given in the principles and use of healthful and appropriate clothing and in the needlework of the home. The course provides for five term's work. During the first term instruction is given in the elements of sewing, including different stitches, seams, hems, and the various kinds of mending; also practical talks on the use and care of the sewing basket, touching the history of the various implements used, and upon the textiles used—cotton, wool, linen, and silk.

In the second year instruction is given in cutting and making plain garments, drafting underwear, shirt waists, and cotton dresses—taught by a simple method in which only a tape line and square are used.

In the third year the more difficult work of dressmaking is taken up, pattern drafting, designing, cutting and fitting dresses. A practical aid to the work in this subject is offered by a museum of exhibits. These exhibits are kept in the class rooms and include primitive and modern sewing implements, weaving processes and the various cloth fibers.

Lectures are given on the utilitarian and art values of various textiles, and attention is paid to harmony in color.



## SOCIAL CULTURE

A course of lectures is given on the usages of society, including manners, behavior, the voice, conversation, forms of address, invitations, etc. Suggestions are made in reference to reading, literary taste and the choice of books. Special stress is given to the thought that the family life ought to be the highest expression of good society, and that next to the power of thinking correctly is the power of approaching others with ease and speaking with tactful directness.

## SOILS AND FERTILIZERS

Some of the topics studied are: The formation of soils, adaptability of crops to different kinds of soils, chemical composition of soils, physical analysis of soils, interpretation of soil analysis, the judging, rating, and scaling of soils, alkali soils, acid soils, humus and its relations to soil fertility, the factors governing the increase and decrease of the nitrogen of the soil, farm manures—their composition and uses, and their action upon soils—green manures, commercial fertilizers, special purpose fertilizers and their use; the influence of different methods of cultivation upon the fertility of the soil, the food requirements of farm crops, the rotation of crops as effecting the fertility of the soil, the income and outgo of fertility from farms where different systems of farming are followed, the general principles of soil exhaustion and soil improvement and the various factors which affect the fertility of soils. The class room work is supplemented by laboratory practice.

## STOCK JUDGING

Score cards are used to an extent sufficient to familiarize students with that method of judging, and special efforts are made to do systematic and closely critical work in the selection of animals representative of the breeds and for breeding purposes. Living specimens are used and rings made up for the student contests in stock judging. In connection with the work in dressing and curing meats, the judgment passed on live animals for the block is verified by score cards, judgment of the dressed carcasses, and by actual block tests. These tests are made by the students and bring out the percentage of meat in each commercial cut of the carcass. The quality of meat is passed upon in this connection by experts, and a careful report made to ascertain the type of animals best calculated for the production of the most meat of the best quality.

## STUDY OF BREEDS

The market classes of horses, cattle, sheep, and swine are taken up briefly to bring out the form, quality, and condition desirable and common to the different classes. This is followed in each class of stock with the most common and valuable breeds for the state. These are studied carefully as regards their characteristics and origination, and as to their adaptability to the different Minnesota conditions. This work is illustrated with stock from herds and flocks maintained at University Farm for this purpose.

## VEGETABLE GARDENING

Vegetable gardening embraces the study of garden tillage, irrigation, and rotation of crops; transplanting; formation and care of hotbeds; study of garden insects; and the growth of various vegetable crops.



## VETERINARY SCIENCE

During the A year the student takes up a course of study in veterinary medicine, the purpose of which is to fit him for intelligent care of his farm stock. In this course the teaching is done by means of lectures and reviews and clinical work at the hospital maintained for this purpose. Lectures are illustrated by means of stereopticon charts, manikin of horse, skeleton of horse, and various other appliances.

The work covers the following subjects: Elementary anatomy; elementary pathology; cause and prevention of diseases; diagnosis and treatment of common diseases; examination for soundness; and a final short course on common medicines, studying their effect, uses and doses. At the hospital clinics, students are enabled to examine and care for a variety of cases and to learn the elements of diagnosis for the more common diseases and forms of lameness.

## STUDENTS' TRUST FUND

The class of 1902 left with the school a fund of \$100 "to assist by temporary loans at a reasonable rate of interest, deserving students needing such help, who are not below the B class in the school of agriculture." This fund is in charge of a committee consisting of the secretary, the principal, the preceptress, and the president of the A class.

## THE LUDDEN TRUST

The Honorable John D. Ludden, of St. Paul, gave the University of Minnesota, \$5,000 to be held, invested and re-invested by the University, through its Board of Regents, and the income thereof to be collected, received and applied by said Board of Regents to the financial assistance of students of either sex in the School of Agriculture. Mr. Ludden delivered into the hands of the regents for the principal sum one Northern Pacific registered prior lien railway land grant gold bond of the denomination of \$5,000, payable to the University of Minnesota, and its assigns in gold coin, on the first day of January 1997, with interest at 4 per cent per annum, payable quarter-yearly in like gold coin, the fund to remain so invested until the bond matures, unless by reason of changed conditions a re-investment shall be sooner deemed judicious by the Board of Regents for the safety, conservation, or continued productiveness of the fund. The premium on the purchase of this first grade security was \$212.50, and was paid by Mr. Ludden, thus enlarging his donation by that amount.

Mr. Ludden imposes the following conditions: "The beneficiaries must be youths who are residents of the state of Minnesota; they must be and continue of unblemished moral character, and of temperate and industrious habits, and they must be such as by examination and trial shall evince and maintain a taste, habit and aptitude for study and improvement; and any student who shall fail to come, or shall cease to be, within the above conditions shall forfeit all claims to the benefit of such fund. Subject to these conditions the administration of such income is entrusted to the said board of regents, which may make such rules therefor as they may deem judicious."

This fund produces \$200 a year. Those wishing to avail themselves of its benefits should apply to the executive committee of the Board of Regents of the University of Minnesota.

Mr. Ludden has since donated another \$5,000 for a like purpose so that the yearly income is now \$400.

# Intermediate Year

For Graduates of the School of Agriculture who wish  
to enter the College of Agriculture

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The course of study in the School of Agriculture extends over three years, and the school year is six months long. This does not give sufficient time for preparation for college work, and it has been found necessary to supplement the course offered in the School of Agriculture by an additional year's work in general academic branches. The subjects offered in the intermediate year can be taken elsewhere in any accredited high school before entering the School of Agriculture. This intermediate year enables graduates of the School of Agriculture to enter the College of Agriculture on the same basis of preparation as students enter other departments of the University. English and mathematics are given prominence in the intermediate year.

The following prescribed course, or its equivalent taken in some other school is required of graduates of the School of Agriculture, who desire to gain admission to the College of Agriculture.:

## FIRST SEMESTER

Elementary algebra [5]  
Plane geometry [5]  
English [5 ]  
General history [4]

## SECOND SEMESTER

Higher algebra [5]  
Plane geometry [5]  
English[5]  
General history [4]

The course in algebra for the intermediate year covers Downey's Complete Higher Algebra through logarithms except chapter 14 part I, and chapter 18 and parts of 19 and 20 Part II, covering subjects not specially pertinent to the work of this college. The course in Plane geometry covers Gore's geometry from book I to V or equivalent texts.

Special attention is given in both above courses to practical problems, short methods of computation and a good foundation for plane trigonometry. These courses are open to all who have completed the work in algebra in the third year of the School of Agriculture and are required of all students entering college courses, except that the 2nd term algebra is not required for the course in Home Economics. Regular high school graduates will be required to take the work of the second semester

in higher algebra unless they can furnish regular high school record in same.

The work preliminary to these courses is done by the student in the A year in the School of Agriculture.

The course in English extends through both terms. Two periods a week are devoted to composition, with Scott & Denny's Composition. Rhetoric as a text-book, and three to the study of literature, which will also be made the basis of considerable written work. The characteristic works of the following authors will be studied: Shakespeare, Bacon, Milton, Addison, Gray, Goldsmith, Burns, Wordsworth, Lamb, Macaulay, Ruskin, Browning and Tennyson. Individual members will be assigned readings from various other authors.

### CROOKSTON SCHOOL OF AGRICULTURE

The Crookston School of Agriculture, Crookston, Minn., established by the legislature of 1905, is in active operation and offers to the young men and young women of the Red River Valley a three years' course in practical farming and home-making. The school year for 1909-10 will open October 5, 1909 and close March 52, 1910. For further information address Crookston School of Agriculture, Crookston, Minn.

### THE MINNESOTA FARM REVIEW

The Minnesota Farm Review is a monthly agricultural paper owned and published by the Alumni Association of the School of Agriculture. The paper is intended to be a medium by which the former students of this institution shall be kept in touch with each other and also with the School and Experimental Station. It also endeavors to bring the farmers throughout the state generally, into closer connection with the institution and to this end strives to present the latest progress in experimental work at the various Stations. It is the official organ of the Alumni Association and of the Farmers' Club.

### THE FARMERS' CLUB

The Farmers' Club of Minnesota is an organization composed of students and ex-students and members of the faculty of the School of Agriculture. Any one who has ever registered as a student in the regular, dairy, or short course or who is or has been a teacher in the School of Agriculture, is eligible to membership. The objects of the club are to foster and strengthen the ties between the School and its former students and to extend the work of the School and Experimental Station among the farmers of the state. To this end the members of the State Club

have formed County Clubs which hold annual meetings for the benefit of the farmers of the community. To quote from the annual address of its president: "The School of Agriculture is an institution of the farmers, for the farmers, and supported in a large measure by them, and each student of the School should use his knowledge to better the conditions about him. The State has invested from one to several hundred dollars in his education and expects to realize on that investment by the knowledge which he will distribute."



# Dairy School

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## FACULTY

CYRUS NORTHROP, LL.D., President.  
J. W. OLSEN, B.S., Dean.  
T. L. HAECKER, Dairy Husbandry and Animal Nutrition.  
E. K. SLATER, Dairy Husbandry.  
J. A. VYE, Creamery Records and Accounts.  
HARRY SNYDER, B.S., Dairy Chemistry.  
M. H. REYNOLDS, M.D., D.V.M., Diseases of the Dairy Cow.  
J. M. DREW, Forage, Farm Buildings.  
WM. BOSS, Practical Engineering.  
H. L. RUSSELL, Ph.D., Dairy Bacteriology.  
ELOV ERICSSON, Cultures and Starters.  
I. O. DYBEVICK, Butter-making.  
M. P. MORTENSEN, Cultures and Starters.  
GEO. P. GROUT, Dairy Laboratory.  
H. T. SONDERGAARD, Judge of Dairy Products.  
A. G. SCHANDELL, Assistant in Cultures and Starters.

The next session of the Dairy School will open Monday, November 15th, 1909, and continue four weeks.

This course is designed to furnish persons who are actually engaged in the manufacture of butter and cheese in creameries and cheese factories an opportunity to become more skilled in their work and also to study the many problems which have a direct bearing upon the dairy industry. Recognizing the fact that such persons cannot be away from business for a long period, the term has been so arranged that the time of each student is fully occupied by lectures and actual work in the creamery training room every hour of every working day of the term.

The rapid growth of the dairy industry in the Northwest calls for constant enlargement in equipments for dairy hall.

With each succeeding year, as dairy products manufactured in our creameries take higher rank in quality and finish, the character of the instruction given must be of high order. To meet these requirements the training rooms are each year equipped with the best apparatus, and the corps of instructors is composed of the most skillful workmen and best instructors.

No pains will be spared to maintain the high standard which the school has attained. Each member of the faculty has special qualifications for the duties to which he has been assigned. The lecture course and practical instruction are arranged with special reference to giving the greatest amount of training and practice possible in a four weeks' session.

Instruction is divided into seven courses:

- 1st. Lectures covering the entire field of dairy husbandry.
- 2nd. Practical work daily in the butter room.
- 3rd. Practical work daily in the cheese room, where the manufacture of flats, cheddars, Swiss, brick, Edam and Gouda cheese is carried on.
- 4th. Practice work in the laboratory, examining milk, making daily composite tests, and the pasteurization of milk and cream.
- 5th. Practical engineering, steam fitting and plumbing.
- 6th. Practical work in factory bookkeeping.
- 7th. Practical work with cultures and starters.

### LECTURES

The course in sixty lectures furnishes in a plain and concise form the most valuable information for those who are interested in any branch of agriculture, covering, as it does, the most important points in the breeding, rearing, feeding, and general management of dairy stock, the economical production of milk, growing and preserving of forage and grain crops, the management of meadows and pastures, management of barns, stables, and yards, construction of silos, co-operative dairying, creamery and cheese factory management, judging and marketing dairy products, the chemistry of milk, dairy bacteriology, engineering, animal hygienine, and treatment of the common diseases of the dairy cow.

### BUTTER MAKING

The running of separators, ripening and churning cream, how to ripen cream to secure best flavor, how to churn, wash, and salt butter so as to avoid specks and mottles, to secure good grain and best methods of preparing for market are some of the points which receive special attention. As all creamery men should be able to judge butter from a commercial standpoint, students are trained daily in the art of scoring butter by the score card.

### CHEESE MAKING

The work in the cheese room is conducted on a large scale, including the manufacture of several brands of fancy cheese. The fact that there is a demand for these at highly remunerative prices has induced the Regents to provide the necessary means for carrying on this work.

A complete record of every step taken is required of each student. Here is a good opportunity for cheese makers to meet, investigate new methods, make experiments on doubtful points, compare notes, and thus gather, in a few weeks, knowledge that otherwise would take years to acquire.



### MILK TESTING

It has been found that the value of milk for both butter and cheese is measured by the per cent of fat content, and nearly all our factories and creameries now base the payment for milk on the fat content. It is therefore necessary for every

factoryman to familiarize himself with the best methods of milk testing. The chemist gives a general outline of the work, but in order that each student may have thorough training in milk testing, daily exercise is given. Steam turbine and hand power machines and other apparatus are provided and operated in the laboratory.

The pure and wholesome milk and cream supply for our cities is a matter of vital importance, and there is great need for improved methods of handling milk intended for this purpose. To meet this, milk and cream pasteurizing apparatus of the latest and most improved makes has been provided for the dairy school, and a few advanced students will be given instruction in this work.

### MOTIVE POWER

The work in engineering consists of practical talks on the construction, care, and management of creamery engines and boilers, pumps, injectors, heaters, etc., and work in the practice room.

In the practice room are provided an eight horse power, simple, slide-valve engine, three types of boiler feed pumps, two types of deep well pumps, one injector, two milk pumps and a steam gauge, which the students have the privilege of examining and operating. Instruction is also given in pipe fitting, placing shafting, babbiting bearings, soldering, etc.

It is the aim to make this work as practicable as possible. Questions of interest on the subject are freely discussed.

### FACTORY BOOKKEEPING

All the essential features of creamery accounting from the receipt of the milk to the returns in net proceeds are thoroughly considered. Paying for the milk according to the fat content, or otherwise, is fully explained. The students do the actual one month's accounting of a creamery in books provided.

### STARTERS AND CULTURES

Since all students who are admitted to the school have had some experience in the routine work of running separators and since the most important part in butter making is the art of uniformly making a product having a fine flavor and good keeping qualities, special attention is given to cultures, starters, and pasteurization. Constant additions will be made to the equipment needed to make this course inviting to those who wish to fit themselves for masters of the art of creamery butter making.

### REQUIREMENTS FOR ADMISSION

Experience has shown that students who have had some practical training in the creamery or cheese factory before coming to the dairy school are, as a rule, the ones who are able to make the most of the course; it is therefore required that persons who intend to take this course shall have had at least one season's experience before coming to the school. No entrance examination is required.

### EXPENSE

A registration fee of \$15 is required of each student. Students can board in either city and reach the school by street car, or board can be secured near the school for from \$3.50 to \$4.00 per week. Each student

is required to supply himself with two white suits, including caps, to be worn during working hours in the creamery and cheese rooms. The suits may be procured for about \$1 each.

### DAIRY CERTIFICATES

The Regents will grant dairy certificates to students who have taken the course and passed a satisfactory examination and in addition have demonstrated by at least one year's work in a factory that they have acquired special skill in the art of butter and cheese making, and are thoroughly qualified to take charge of a creamery or cheese factory.

To reach the school from either St. Paul or Minneapolis, take the Como-Hopkins of Como-Harriet street car and get off at Commonwealth avenue.

Address applications for admission to T. L. Haecher, University Farm, St. Paul, Minn.

# Short Course for Farmers

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## FACULTY

CYRUS NORTHROP, LL.D., President.  
J. W. OLSEN, B.S., Dean.  
SAMUEL B. GREEN, B.S., Horticulture, Forestry.  
J. A. VYE, Business Methods.  
HARRY SYNDER, B.S., Agricultural Chemistry, Soils.  
T. L. HAECKER, Dairy Husbandry and Animal Nutrition.  
M. H. REYNOLDS, M.D., V.M., Veterinary Science.  
J. M. DREW, Poultry, Workshop Hints.  
A. BOSS, Live Stock, Dressing and Curing Meats.  
WM. BOSS, Farm Mechanics.  
F. L. WASHBURN, M.A., Insect Enemies.  
E. M. FREEMAN, Ph.D., Plant Diseases.  
COATES P. BULL, B.Agr., Farm Implements, Grains.  
W. L. OSWALD, Farm Botany.  
D. D. MAYNE, Parliamentary Practice.  
A. L. EWING, M.S., Farm Physics.  
JUNIATA L. SHEPPERD, Domestic Science.  
MARGARET BLAIR, Domestic Arts.  
J. T. STEWART, B.S., Farm Drainage.  
GEO. P. GROUT, B.S., in Agri., Dairy Stock.

This course of instruction is provided by the Faculty of the School and College of Agriculture to meet the needs of men and women of mature years who are actively interested in the work of the farm.

The next term will be open on Friday, Jan. 14th, and will continue for four weeks, closing on Friday Feb. 11th, 1910.

This is a lecture course, covering the more important branches of agriculture, horticulture, live stock, farm botany, farm chemistry, entomology, poultry, dairying, etc. Special instruction will be given in the judging of grains, soils, and animals.

The daily program will be so arranged as to allow the ladies to take the lectures in entomology, botany, horticulture, poultry, and other subjects of the short course in which they would be interested in common with the men.

Work will begin at 8:15 o'clock a. m. and close at 3:40 p. m. During the course there will be no work on Monday, but this day will be spent in visiting places of interest such as the stock yards, stock farms, flour and flax mills, etc.



For the entire course, or any part thereof, registration fee of \$5.00 will be charged.

Those taking this course should register and secure boarding places not later than Thursday, January 13th, as work will begin promptly at 8:15 on Friday, January 14th.

Board may be secured in either of the Twin Cities at \$3.50 to \$4.50 per week.

Farmers wishing to register for the course, or desiring further information, should write to D. D. Mayne, Principal, or Jas. M. Drew, Registrar, University Farm, St. Paul, Minn.

## AGRICULTURAL CHEMISTRY

The chemistry of plant growth and the chemical principles involved in farm life, and their application to the production of crops, form the basis of this work.

### AGRICULTURE

The selection of farms and soils suitable for specific crop production; planning farms; developing the fields, drainage, roads, fences; developing the farmstead and its buildings; managing fields and growing, cultivating harvesting and preserving forage and grain crops; the rotation of grain, cultivated and grass crops; the use of live stock; and general farm management.

### ANIMAL HUSBANDRY

A series of lectures will be given on animal breeding. These lectures will include the known laws of breeding, such as heredity, variation and atavism. Attention will be given to such features as the selection of prepotent sires and dams, to cross-breeding, in-breeding, and other matters of interest to the breeder of live stock. Pedigrees will be discussed and the students made familiar with the registration and transfer of pure bred stock. The feeding and management of horses, beef cattle, sheep and swine will also be discussed. Foods suitable to each class of animals, and methods of preparing and feeding them will be among the subjects receiving attention, together with directions for the practical management of stock while in the stable and pasture.

### DAIRY HUSBANDRY

The lectures in dairy husbandry will cover the characteristics of the various breeds of dairy cattle, their comparative adaptability for the various phases of dairying and the style or type of cow that has demonstrated her ability as a large and economical producer. The scientific

and practical phases of feeding for milk production will be explained, and practical instruction and training given in calculating rations for milk production.

### DAIRY STOCK JUDGING

The instruction given in judging dairy stock will be based upon the actual performance of animals bred and reared in the dairy division, the records covering a period of five years and giving the annual yield of milk and butter fat, cost of production and profits.

### DRESSING AND CURING MEATS

The work in dressing and curing meats will be given in a course of demonstration lectures. In demonstrating these lectures the animals will be dressed before the class and the reason for each operation fully explained. The methods of cutting up the dressed carcass for different purposes will also be shown before the class and the use and value of each cut explained. Sausage making, lard rendering, and the "working-up" of all parts of the animals will be taught in a simple and direct way.

### ECONOMIC ENTOMOLOGY

The entomologist will give a course of lectures on injurious and beneficial insects, and will discuss the various insecticides and methods of application. The four-footed pests of the farm—rabbits, gophers, etc., are also studied, and a few lectures are given on practical bee-keeping. If there be sufficient demand to warrant, and time permits, a few lectures will be given on birds and their relation to agriculture.

### FARM ACCOUNTS

A series of lectures will be given on business forms, business arithmetic and the keeping of simple farm accounts and records.

### FARM BOTANY

Eight lectures will be given on the phases of botany of special interest to farmers. For example, the pollination of flowers, weeds and weed seeds, poisonous plants, fungus diseases of plants and how to deal with them will be considered.

### FARM HORTICULTURE

Lectures will be given on the care and management of the apple and plum in this climate, including such subjects as location of the orchard, selection of the trees, planting, cultivation, green manuring; prepara-

tion for winter; advantages and disadvantages of root grafting, budding and top working; diseases injurious to orchards. Lectures on the care and management of small fruits will consider the subjects of selection of varieties, planting and cultivation, origin of new varieties, propagation, marketing, winter protection, also the insects and diseases injurious to raspberries, blackberries, currants, gooseberries, strawberries and grapes. Under vegetable gardening will be considered the growing of potatoes, tomatoes, celery, onions, squash and cucumbers.

### FARM IMPLEMENTS

The lectures on farm implements will be illustrated, as far as possible, by samples. Stereopticon views will be made use of in illustrating machines that cannot well be taken to the class room. It is the aim in these lectures to bring out the lines covering the draft of implements and the objects attained by their use. Suggestions will be made on selection of implements adapted to various kinds of work. The care of implements when not in use will also be discussed, and an attempt made to give as fully as possible all information that will be beneficial in the care and handling of farm machinery.

### FARM MECHANICS

The instruction given in this subject will consist of lectures on farm mechanics, taking up such subjects as pumps, farm water systems, windmills, the general principles of steam and gasoline engines, placing shafting, pulleys and belts, pipe fitting, soldering, etc. Some instruction will also be given in sharpening and using hand tools, such as saws, planes, chisels and other tools necessary in farm practice.

### PHYSICS AND FARM DRAINAGE

This course consists of six lectures with illustrative experiments. In these exercises the following topics are discussed: The principles of draft in the horse; the causes of draft in wagons, including the effect of road-bed; the effect of grades or hills, involving the principle of the inclined plane; the various questions involved in eveners, road construction and maintenance; including the question of reducing grades, the power at which a horse works to secure the necessary change in the soil to produce the highest degree of plowing, hauling, etc.; horse power; weather forecasting.

### POULTRY

Lectures will be given on this subject with special reference to the needs of the Minnesota farmer. The following subjects will be considered Location and construction of poultry buildings and yards; a study of the

breeds best adapted to the farmer's use; the hatching, rearing and management of the farmer's flock; feeding for eggs and for fattening; killing and dressing fowls, and packing for market; marketing eggs.

## SOILS

Lectures are given on the conservation of the fertility of the soil, the composition and use of farm and commercial manures, the draft of different farm crops upon the soil and the methods of making the fertility of the soil available by the rotation of crops and other means so as to secure the necessary changes in the soil to produce the highest degree of fertility. The judging of soils is made a feature of this work and includes the testing of soils and the determination of the type to which a soil belongs, the methods of cultivation and the crops most suitable to grow upon the soil.

## VETERINARY SCIENCE

This work includes a series of lectures on elementary anatomy, animal foods and digestion; and causes, prevention and treatment of common diseases of farm stock. An especial effort is made to have this work practical and helpful to men who are actually handling farm stock.

## WORKSHOP HINTS

In addition to the above, four lecture periods will be devoted to farm workshop hints, such as splicing rope, making rope halters and rope belting, and tempering simple tools.

# Short Course for Teachers

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## FACULTY

CYRUS NORTHROP, LL.D., President.  
C. G. SCHULZ, State Superintendent of Public Instruction.  
JOHN W. OLSEN, Dean.  
D. D. MAYNE, Principal.  
SAMUEL B. GREEN, B.S., Horticulture, Forestry.  
HARRY SNYDER, B.S., Agricultural Chemistry, Soils.  
T. L. HAECKER, Dairy Husbandry, Animal Nutrition.  
M. H. REYNOLDS, M.D., V.M., Veterinary Science.  
ANDERW BOSS, Agriculture, Animal Husbandry.  
FREDERICK L. WASHBURN, M.A., Entomology.  
E. M. FREEMAN, Ph.D., Plant Pathology.  
WILLIAM BOSS, Farm Mechanics.  
J. A. VYE, Secretary and Treasurer, Accounts.  
J. M. DREW, Registrar, Blacksmithing, Poultry.  
FANNIE C. BOUTELLE, Domestic Economy.  
JUNIATA L. SHEPPERD, M.A., Domestic Science.  
MARGARET BLAIR, Domestic Art.  
JOHN A. HUMMEL, B. Agr., Assistant in Agricultural Chemistry.  
COATES P. BULL, B. Agr., Assistant in Agriculture.  
LEROY CADY, B.S., in Agr., Assistant in Horticulture.  
D. A. GAUMNITZ, M. Agr., Assistant in Animal Husbandry.  
A. D. WILSON, B. S. in Agr., Assistant in Agriculture.  
A. G. RUGGLES, M.A., Assistant in Entomology.  
T. P. COOPER, B.S., in Agr., Assistant in Agriculture.  
J. P. WENTLING, M.A., Assistant in Forestry.  
A. D. WILHOIT, M.A., Assistant in Soils.  
A. R. KOHLER, B.S.A., Assistant in Vegetable Gardening.

## PURPOSE OF THE SCHOOL

The short summer course for teachers, principals, and superintendents, has been established to meet the demand for agricultural instruction by educators who wish to teach the elements of agriculture, or who wish to be able to supervise the teaching of the subjects intelligently in the public schools. It is intended to be especially helpful to teachers who



desire to be more efficient in teaching the elements of agriculture in rural schools, or in small village schools having an attendance largely from the country.

High school teachers who wish to get more complete information on agricultural subjects and technical work so as to make more practical their teaching of botany, physics, chemistry, and other natural sciences, may find here the opportunity they have long been seeking.

Principals of high schools who wish to introduce carpentry, blacksmithing, the elements of agriculture, sewing, cooking, may here get such an insight into the subjects that they may go about their introduction and supervision with some degree of confidence.

County superintendents having to do with country conditions more than others should seek to become familiar with modern agricultural problems and their solution. It is hoped that this short course may appeal to all the special classes mentioned as well as to some who are interested merely in the form of industrial education presented as a means of general information and culture.

### LOCATION

The school is located at the University Farm, midway between Minneapolis and St. Paul. It is about a 15-minute walk from the street car line. To reach the school from either city, take a Como-Harriet or Como-Hopkins car, and get off at Commonwealth Avenue.

Although the school is located in the country, and has all the advantages of the quiet and fresh air of the country, yet it is close enough to the Twin Cities to get all the benefits of these large centers. No more beautiful spot between the two cities could have been selected for such a school. Situated on picturesque hills, overlooking the midway and the two cities, the buildings are grouped conveniently about the undulating campus. Nature has done much to make this a beauty spot and the landscape artist has added to the beauty in the arrangement of paths and the replacing of trees and shrubs with many varieties suited to the climate.

### PLAN OF THE COURSE

This course is complete in itself, covering three weeks of lectures and laboratory work, commencing Monday, June 21st, and closing Saturday, July 10th, 1909.

It is expected that those who register for the course will take the work as outlined, the topics under consideration have been chosen with great care with reference to a useful and logical arrangement. The morning sessions are planned to interest the entire class in one body, while the afternoon periods offer an optional course. Those desiring to specialize in domestic science and art find that work offered, while the men are occupied in blacksmith and carpentry shop work.

## EXPENSE

The registration fee for the entire course or for any part of it, is \$3.00.

Good board will be furnished at the large dining hall for \$3.50 per week. Dormitory rooms may be used free of charge. These rooms have all necessary furniture, except pillows, pillow cases, sheets, quilts and towels. Those expecting to occupy the dormitories should bring such articles with them. If desired, the articles named may be rented at the school for 60 cts. per week. It will aid greatly in making arrangements for the proper accommodations, if those who expect to attend will write of their intention before June 1st.

Any one desiring further information in regard to this course may apply to Jas. M. Drew, Registrar, University Farm, St. Paul, Minn.

## THE CONFERENCE HOUR

A conference hour is arranged for each day before dinner. At this time subjects of special interest to school men and women will be considered. Round table discussions of pedagogical problems especially related to the introduction of vocational subjects into the public school curriculum will be held.

Short talks and lectures by men prominent in educational work will be given. All subjects presented will be open for question and debate.

A number of evening lectures and entertainments will also be provided during the course.

During the course Dr. Reynolds will give two illustrated lectures on ventilation and animal diseases.

## AGRICULTURE

The lectures in agriculture will cover the principles of soil formation and classification, soil water, its movements, and effect on plant growth; the relation of tillage to plant growth and the effect of tillage on the conservation of soil fertility. Field crops, their cultivation, growth and care, will be presented from the standpoint of economic relation to farming. A series of discussions of the arrangement of crops and of farm plans will form a distinctive feature of this subject, thus giving the principles of soil preparation, crop growth and farm management.

## AGRICULTURAL CHEMISTRY

The composition and comparative value of food materials, the changes which take place during the production, and the application of the principles of chemistry to plant and animal life form the basis of this work.

## ANIMAL HUSBANDRY

In animal husbandry, the work will consist of sketches of the history, development and classification of the various classes of live stock and their relation to farming; of comparisons of the types of each class, and a study of the breeds of horses, cattle, sheep and swine. Good specimens will be used for illustrating the characteristics of each breed and for demonstrating the principles of selecting for specific purposes.

## BLACKSMITHING

A course of lessons in iron work will be offered to those who desire to prepare for teaching this subject in the common schools. This course will cover the essential principles of forging iron and steel and tempering tools in common use.

## DAIRY HUSBANDRY AND ANIMAL NUTRITION

The lectures will cover the characteristics of the various breeds of dairy cattle, their adaptability for the various phases of dairying, and the style or type of cow that has demonstrated her ability as a large and economical producer. Instruction will be given in the scientific principles and practical phases of feeding, and training will be given in calculating and formulating rations.

## DAIRY STOCK

The instruction given in dairy stock will be based upon the actual performance of animals bred and reared in the dairy division, the records covering a period of five years giving the annual yield of milk and butter fat and the cost of production and profits.

## DOMESTIC ART

The course will consist of lectures and exercises on models and plans for graded work in the public schools, including basting, the seam, the hem, the gusset, the placket, patching, darning, buttonholes and other hand sewing, also garment drafting and making, including the shirt waist. Lectures will be given on the production and use of textiles, the judging of fabrics, the harmony of color, and the beautifying of the useful in the school room.

## DOMESTIC SCIENCE

This work will consist of lectures, class room demonstrations and of such library research as will enable students to make bibliography, which will aid in securing reliable data for use in teaching this subject. The principles set forth in the lectures and discussions will be illustrated in

either demonstration lectures or in individual practice, as the majority of the class may elect. The various methods of teaching this subject, now in general use, will be discussed and exemplified. In connection with this, a list showing utensils needed for a laboratory kitchen with approximate cost will be compiled and considered.

Results of experiments will be studied to ascertain the best means for introducing into the rural schools some work along domestic lines.

## ENTOMOLOGY

Lectures will be given on the important features represented by this department. Such subjects as scale insects, plant lice, bee keeping, friendly insects, etc., will be dealt with in an effort to make the course as comprehensive as time permits, and suited to the needs of teachers.

## HORTICULTURE AND FORESTRY

The course in horticulture and forestry will include lectures and laboratory periods, aimed to illustrate the fundamental principles underlying these subjects, and to show the best way in which they can be taught.

## PLANT DISEASES

Lectures will be given on important plant diseases of farm and garden crops; their economic importance, botanical features, and methods of prevention and cure. Demonstrations and exhibitions of material will also be given.

## POULTRY

A course of lectures and demonstrations in the care and management of poultry will be given, covering the subjects of poultry buildings, the breeds of poultry, incubation, brooding, feeding, and marketing. This course will be given at the season when incubators and brooders are in use, thus affording a chance for practical work in this line to those who desire it.

## SOILS

Formation, physical properties, chemical composition and the judging, rating, and scaling of soils are studied in the laboratory. Lectures are given on the principles of soil fertility and the composition and use of farm and commercial manures.

# TENTATIVE PROGRAM

Monday, June 21, Registration

	8:15	9:05	9:55	10:45	11:35	1:15	2:05	2:55	3:45
Tuesday, 22nd....	Agriculture	Fruit Growing	Household Art Lecture	An. Husbandry Cattle	CONFERENCE HOUR.	Chemistry Lecture	Chemical Laboratory		
Wednesday, 23d ..	"	"	"	"		Soils Lecture	Soils Laboratory	Field Practicums	
Thursday, 24th ...	"	"	"	"		{ Blacksmithing Lecture and Shop Work Carpentry Lecture and Shop Work	{ Household Art Domestic Science		
Friday, 25th. ....	"	"	Domestic Science Lecture	Sheep		Dairy Lectures	Dairy Practicums		
Saturday, 26th....	"	Dairy Lectures	"	"		Chemistry Lectures	Chemical Laboratory		
Tuesday, 29th ....	"	Vegetable Gardening	"	"		Soils Lecture	Soils Laboratory	Field Practicums	
47 Wednesday, 30th..	"	"	Entomology	Swine		{ Blacksmithing Lecture and Shop Work. Carpentry Lecture and Shop Work	{ Household Art Domestic Science		
Thursday, 1st.....	"	"	"	"		Dairy Lectures	Dairy Practicums		
Friday, 2d.....	"	"	"	Poultry		Chemistry Lectures	Chemical Laboratory		
Saturday, 3d .....	"	Dairy Lectures	Plant Diseases	Horses		Soils Lecture	Soils Laboratory	Field Practicums	
Tuesday, 6th.....	"	Forestry	"	"		{ Blacksmithing Lecture and Shop Work Carpentry Lecture and Shop Work	{ Household Art Domestic Science		
Wednesday, 7th...	"	"	"	"		Dairy Lectures	Dairy Practicums		
Thursday, 8th. ....	"	"	"	"		Chemistry Lectures	Chemical Laboratory		
Friday, 9th. ....	"	"	"	"		Soils Lecture	Soils Laboratory	Field Practicums	
Saturday, 10th. ....	"	Dairy Lectures	"	"		{ Blacksmithing Lecture and Shop Work Carpentry Lecture and Shop Work	{ Household Art Domestic Science		



## THE SHORT COURSE IN TRACTION ENGINEERING

The growing use of traction engines in general farm work has made it advisable to offer a special course in the use of power machinery as one of the "short courses" in the Department of Agriculture of the University of Minnesota.

The course is complete in itself, covering four weeks of study and practice. The mornings are devoted to lectures and class-room work, and the afternoons to actual practice in the various departments under the supervision of the instructors of the school.

Such a course opens a great opportunity to the young man interested in mechanics, or to the one who has had some practical experience in the handling of engines, offering in a short time the training in the theory of engineering.

## EXPENSE OF COURSE

The tuition for the entire course is fifteen dollars, payable as a registration fee at the time of entrance. This covers the instruction in all departments, traction stationary and gas engines. No deduction is made if the student elects but a part of the course, or fails to complete work from any cause whatever.

Each student is required to furnish work-clothes, overalls and gloves, and be prepared for expense of car-fare on trips of inspection to visit factories, etc.

## ARRANGEMENTS FOR ACCOMMODATION

Good board and room will be furnished on the campus of the school for \$3.50 per week. The large dining-hall at the school will be in service, and the dormitory rooms may be used under proper regulations. The rooms have all necessary furniture except pillows, sheets, quilts and towels. These articles may be brought from home by the student, or for a small fee he may rent them for use during the month.

This arrangement will keep all the students together and will allow more time for the practice work in all departments.

## REQUIREMENTS FOR ADMISSION

Any person of good moral character, who can read and write, may be admitted to this school. No entrance examination is required. The work is made so plain and simple that those whose education is limited may pursue the course with profit. Knowledge of physics or of algebra

is not necessary. Those who have had these subjects may make good use of their knowledge in the course, but they are not required for admission.

### TIME OF SESSION

The Short Course in Traction Engineering opens Tuesday, May 24, and continues for four weeks, closing Friday, June 17, 1910. Those desiring to take the course should register and secure boarding places not later than Monday, May 23, as work begins promptly Tuesday morning.

### COURSE OF STUDY

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#### TRACTION ENGINES

**STEAM.**—Properties of steam, the steam table, latent heat of vaporization, total heat of vaporization, specific volume of steam, work done by steam, work diagrams, expansion of steam.

**BOILERS.**—Types of boilers: Steam boiler, locomotive boiler, return-flue boiler, the vertical boiler. Construction and repairing of boilers. Boiler materials. Riveted joints, staying flat surfaces, tubes and tube sheets. Boiler fittings: Fusible plugs, grates, safety valve, steam and water gauges, the whistle. Boiler feeders: Pumps, the injector.

**COMBUSTION OF FUELS.**—The process of combustion: Igniting temperature; products of combustion; combustion of carbon complete; combustion of carbon incomplete; combustion of hydrogen; heat of combustion; temperature of combustion; conditions required for economical combustion. Fuels. Firing.

**THE TRACTION STEAM ENGINE.**—The mechanism of the steam engine. The slide valve and steam distribution: Outside lap, inside lap, angle of advance, effects of lap, lead, position of the eccentric, rocker-arms, direct and indirect valves, setting the slide valve, dead centers, to place the engine on its dead center, directions for setting slide valve. Reversing gears: Single-eccentric reversing gear, the Stephenson link motion. Compound engines: Efficiency of heat engines; absolute zero; absolute temperatures; principles of the compound engine; compound traction engines. Various details of the traction engine: The traction gearing; compensating gear; drive wheels; the governor; cylinder lubricators. Operation and care of the traction engine: General examination; the boiler; feedwater; exhaust nozzles; use of the whistle; the engine; starting the engine; the engine on the road; guiding the engine; the friction clutch; setting the engine; connecting-rod brasses; tests for leaks; friction and lubrication; winter care of the engine; portable engines.

INDICATORS AND INDICATOR DIAGRAMS.—Description of the indicator. Directions for using the indicator: Reducing motion; directions for taking indicator diagrams; points and lines of the diagram. Horse-power: Mean effective pressure; approximate determination of mean effective pressure; piston speed; friction horse-power; net horse-power mechanical efficiency. To find the traction force of a traction engine. Reading indicator diagrams. Operation of traction engine: Ascending and descending hills, pulling load in the sand, in mud, over bridges, getting out of a sink hole, etc.

## STATIONARY ENGINES

Although the general principles given with reference to traction engines apply with equal force to stationary engines, yet there are some subjects that should be taught with reference to the stationary engine that do not apply to the traction engine. Students who wish to do so may take this work in a special class that will be formed of those interested in stationary engines.

## GASOLINE ENGINEERING

Within the past few years the engines using the explosive power of gas as the means of securing mechanical motion have come into very extensive use. Whereas ten or fifteen years ago such engines were very few in number and very uncertain in results, at the present time they probably outnumber engines of all other kinds, and in point of efficiency they are an undisputed success. The use of denatured alcohol in such engines, it is hoped, will greatly decrease the cost of operation and will increase the number used. Instruction in the construction and operation of gasoline and other engines of this class will be given throughout the term. The use of the gasoline traction engine will also be taught, and practical work on it will be given.

Those who complete the work with the gasoline engine will be given a special certificate for that course.

## BLACKSMITHING

The competent enginner should know how to handle iron at the forge. He should be able to weld when the necessity arises and to temper his tools skillfully. To the students of this course a series of practical exercises will be offered covering the elements of iron and setel forging, tool making and tempering. The aim will be to make the course as useful as possible to threshermen and engineers.

## BABBITTING

Lectures will be given on babbitt and babbitting. Each student will be required to do actual work in babbitting boxes.

## BELT-LACING

Demonstrated lectures are given on the speed of pulleys, belting and belt-lacing. Students are required to figure speed of pulleys and make samples of the belt-lacing in common use.

## PIPE-FITTING

Demonstrated lectures are given on pipe-fitting, valves, etc. Students are required to cut and thread pipes and do some work in pipe-fitting.

## ROPE-SPLICING

Every thresherman and engineer should know how to splice a rope and tie all the useful knots known to the sailor. A series of lessons in this art will be given covering all the common knots and splices.

## SOLDERING

Demonstrated lectures are given on tinning, making soldering acids and soldering iron. Students are required to solder samples of various metals, etc.

## TUBE SETTING

Instruction in tube setting is given, and students are required to put in and remove tubes.

## LICENSE

A number of states require any man who runs an engine to obtain a license based on an examination held by an inspector. The State of Minnesota has such a law:

"Any person who shall operate any steam boiler or steam machinery of any kind without first obtaining a license from an inspector, shall be deemed guilty of a misdemeanor, and fined not less than twenty-five dollars nor more than fifty dollars."

Engineers shall be divided into four classes, namely:

Chief Engineers;

First Class Engineers;

Second Class Engineers;  
Special Engineers.

Chief Engineers must have at least five years' actual experience, and must be qualified to take charge of all classes of steam boilers and steam machinery.

First Class Engineers must have had at least three years of experience, and must show that they are qualified to take charge of all classes of steam boilers and steam machinery not exceeding 300 horse-power.

Second Class Engineers must have had at least one year of actual experience, and be licensed to operate boilers and steam machinery not to exceed 100 horse-power.

Special Engineers, if found competent on examination, are licensed to operate steam boilers and steam machinery not to exceed 30 horse-power.

Pupils who take the course in this school and receive the diploma after examination will receive an engineer's second class license. If the length of service warrants it, first class and chief engineer's licenses will be issued.

Licenses will be issued by the Board of State Boiler Inspectors on payment of the legal fee of \$1.00.

The licenses issued in this state will be accepted by most of the states as evidence of qualification to operate steam boilers and steam engines.

## INQUIRIES

Anyone desiring further information in regard to these courses may apply to Jas. M. Drew, Registrar, University Farm, St. Paul, Minn.



# The Agricultural Experiment Station

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## STATION OFFICERS

J. W. OLSEN, B.S., Director.

J. A. VYE, Secretary.

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## EXPERIMENT CORPS

SAMUEL B. GREEN, B.S., Horticulturist.

HARRY SNYDER, B.S., Agricultural Chemistry and Soils.

T. L. HAECKER, Dairy Husbandry and Animal Nutrition.

M. H. REYNOLDS, M.D., D.V.M., Veterinarian.

ANDREW BOSS, Agriculturist and Animal Husbandry.

FREDERICK L. WASHBURN, M.A., Entomologist.

E. M. FREEMAN, M.S., Vegetable Pathology.

JOHN T. STEWART, B.S., Agricultural Engineering.

J. A. HUMMEL, B.Agr., Assistant Chemist.

COATES P. BULL, B.Agr., Assistant in Agriculture.

A. G. RUGGLES, M.A., Assistant Entomologist.

A. J. MCGUIRE, B.Agr., Superintendent, Grand Rapids.

D. A. GAUMNITZ, M.S.Agr., Assistant in Animal Husbandry.

LEROY CADY, B.S., in Agr., Assistant in Horticulture.

A. D. WILSON, B.S.Agr., Assistant in Agriculture.

WM. ROBERTSON, B.S., Superintendent, Crookston.

C. C. LIPP, D.V.M., Assistant Veterinarian.

A. D. WILHOIT, M.A., Assistant in Soils.

L. B. BASSETT, Assistant in Agriculture.

A. R. KOHLER, B.S.A., Assistant in Horticulture.

T. P. COOPER, B.S., in Agr., Assistant in Agriculture.

W. H. FRAZIER, B.S., Assistant in Soils.

The bulletins of this station are mailed free to all residents of this state who make application for them.

The Agricultural Experiment Station of the University of Minnesota was established by National and State legislation in 1887. The function of the Experiment Station as set forth in the Hatch Act is "to aid in acquiring and diffusing among the people useful and practical information on the subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of

agricultural science." The funds provided by the National Government have been supplemented recently by the Adams Act which will ultimately provide \$15,000 annually, and appropriations for special lines of experimental work have also been made by the State Legislature.

The Experiment Station is located at University Farm, St. Paul, and is one of the Divisions of the Department of Agriculture of the University of Minnesota, and the officers of the station are also professors and instructors in the School and College of Agriculture. The chief executive officer of the station is the Director who is also Dean of the College of Agriculture. Affiliated with the main station are a score or more of trial stations maintained by the State Horticultural Society. The Experiment Station also carries on co-operative tests and investigations with the U. S. Department of Agriculture and with farmers in various parts of the State. The Station has published since its organization in 1887, one hundred nine regular, and thirty-one press and fifteen class bulletins.

The principal lines of work conducted at the station are as follows: Chemistry of soils and farm crops; field experiments—rotations, tests of varieties of cereals and forage crops, time and depth of seeding grains and amount of seed, methods of seeding grasses; horticultural—tests of varieties of fruits and vegetables, use of wind-breaks, testing hardy stocks for apple trees, improvement of native fruits; forestry; diseases of plants; food and nutrition of man; plant and animal breeding; feeding experiments; diseases of animals; entomology, dairying; farm management and farm statistics.

#### NORTHWEST EXPERIMENT FARM

To give special consideration to local conditions in the northwestern part of the state an experiment farm was established at Crookston in 1895. The farm contains 450 acres and is one mile north of the city. It has a well-equipped poultry plant from which much good breeding stock is being distributed among the farmers. With aid from the U. S. Office of Experiment Stations the farm is taking an active part in testing surface and tile drainage for the Red River Valley region. It is also encouraging a more extensive growing of clover. The Crookston School of Agriculture is operated in connection with the farm. (See page 31).

#### EXPERIMENT FARM AT GRAND RAPIDS

The legislature of 1895 also provided for a second experiment farm to make possible a more thorough study of the agricultural conditions of the northeastern portions of the state. This farm was located at Grand Rapids April, 6, 1896, and lies two miles east of the village. It contains approximately 375 acres of land, with the necessary farm equipment consisting of dwelling house, barns, machinery, live stock, etc.

# Bulletins of the Experiment Station for 1908

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## GENERAL BULLETINS

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BULLETIN No. 102—Division of Agricultural Chemistry and Soils. Soil Investigations.

1. Fertilizer tests with wheat and corn.
2. Influence of Fertilizers upon the composition and quality of wheat.
3. A comparison of Chemical methods and field tests for determining the fertilizer requirements of soils.

BULLETIN No. 103—Veterinary division. Dissemination of Tuberculosis by the manure of infected cattle.

BULLETIN No. 104—Animal husbandry and agricultural divisions. Pork production

BULLETIN No. 105—Division of entomology. The importance of the study of entomology. How to collect and preserve insects.

BULLETIN No. 106—Division of dairy husbandry and animal nutrition. Investigation in milk production.

The relation of Nutrient to product.

BULLETIN No. 107—Division of agriculture. Corn breeding in Minnesota.

BULLETIN No 108—Division of entomology. The so-called "Green Bug" and other grain aphids in Minnesota in 1907.

BULLETIN No. 109—Divisions of agriculture and agricultural chemistry and soils. The rotation of crops. 1. Report of 10 years on 44 rotation plots. 2. Influence of rotation of crops and continuous cultivation upon the composition and fertility of soils.

## PRESS BULLETINS

PRESS BULLETIN No. 28—1 The Fall web worm a menace to Minnesota.

2. Autumn remedies for the stalk borer in flower gardens.

PRESS BULLETIN No. 29—Seed corn shortage.

PRESS BULLETIN No. 30—Bearded Spring wheat compared with blue stem in Minnesota.

PRESS BULLETIN No. 31—Suggestions to those Contemplating spraying.

# Students

## STUDENTS—1908-9

Intermediate year.....	7	
A Class.....	108	
B Class.....	171	
C Class.....	368	
		<hr/>
		654
Teachers' Summer School.....	90	
Summer Forestry School.....	18	
Farmer's Short Course.....	169	
Dairy School.....	107	
Crookston School of Agriculture.....	101	
		<hr/>
College course.....	192	
		<hr/>
Total in Department of Agriculture.....	1,331	
Less thirteen duplicates.....	13	
		<hr/>
TOTAL.....		1,318

## INTERMEDIATE CLASS—7

Corser, Frederick, Minneapolis.	Staples, Myrtle C., West Side Sa. R. 2., St Paul.
Dorn, Ivan C., Robbinsdale.	Trieloff, Hattie L., Carver.
Harrison, Earl D., Osseo, R. 1.	White, Sherman L., Excelsior.
Lane, George E., Wayzata, R. 1.	

## A CLASS—108

Albers, Mary W., Northfield.	Carlson, Mabel H., Minneapolis.
Anderson, Fred A., Hutchinson, R. 1.	Chase, Vere E., Minneapolis.
Anderson, Phillip A. W., Forest Lake.	Connick, Bertha J., Westbrook.
Anderson, Sophus H., St. Anthony Park.	Corser, John, Minneapolis.
Ashbach, Otto B., Ada.	Crippen, Lee A., Langdon.
Baker, George J., St. Paul.	Dubbels, Joe P., Viola.
Beckstrand, Andrew C., Brookfield, R. 1	Dvorachek, Henry E., Glencoe.
Benson, Edwin B., Jackson, R. 4.	Ehlers, L. Fred., Marshall.
Berg, Edgar F., Dundas.	Ferraby, Ethel S., Minneapolis.
Bilsborrow, James D., Wolverton.	Forbes, Charley S., West Side Sta., St. Paul.
Blackburn, Robert A., Royal, Neb.	Forsman, John A., Dututh.
Blackburn, Ralph G., Royal, Neb.	Frentz, Frederic H., Waseca.
Bouman, A. W., Minneapolis.	Gammon, Lee M., Wayzata, R. 3.
Braxtan, Robert S., Paoli, Ind.	Gardner, Harriet R., Ortonville, R. 3.
Bredvold, Jacob S., Belview.	Gilbertson, Henry W., Jasper.
Briggs, George McS., Rock Springs, N. D.	Hallan, Henry A., Spring Grove.
Briggs, Mary O., St. Anthony Park.	Hamilton, Vida L., Osseo, R. 1.
Brownell, Max C., Minneapolis.	Hancock, Morris W., Mankato.
Busse, Rose, Merriam Park, R. 8.	Hardisty, Frank J., Minneapolis.

- Helgemoe, Julia E., Canby.  
 Hillman, Frank M., Minneapolis.  
 Hoffman, Ernest D., Marshall.  
 Hofmann, Julius V., Janesville.  
 Holmberg, Mabel O., Center City.  
 Holt, Harry G., Delhi.  
 Jacobson, Henry, Marshall.  
 Jaquith, Harold H., Hopkins, R. 3.  
 Johnson, Clara V., Star Prairie, R. 1, Wis.  
 Johnson, Ernestine M., St. Paul.  
 Johnson, Stella A., Cannon Falls, R. 3.  
 Kelley, Lloyd S., Markville.  
 Knuteson, Einar George H., St. Cloud.  
 Krefting, Carl L., Minneapolis.  
 Lamb, Harvey H., Mazeppa.  
 Lambert, Lenore M., Withrow.  
 Larson, Sallie Marie, North Branch.  
 LaRue, Mary E., St. Paul.  
 Lawrence, Frank E., Litchfield, R. 4.  
 Lemke, William A., Albert Lea, R. 4.  
 Lenz, Valentine L., Albert Lea.  
 Lindall, Oscar R., Parker's Prairie.  
 Ludlow, Herbert D., Worthington.  
 McNelly, Mary E., Caledonia.  
 Mallery, Ema, Lakeville.  
 Manning Nydia A., St. Paul.  
 Matthews, Charles A., Ortonville.  
 Meck, Ethel B., St. Paul.  
 Minton, Harry S., Francis, Sask., Can.  
 Moore, Fred F., Stewart.  
 Morrison, Earl B., Fergus Falls.  
 Nelson, Arthur O., Stillwater, R. 7.  
 Nelson, Arthur S., Afton.  
 Nelson, Ellen L., Hector.  
 Nelson, Emil R., Canby.  
 Nelson, Ida C., Alexandria.  
 Older, Frank E., Luverne.  
 Ott, J. Cyrus, Albert Lea, R. 4.  
 Padden, Roscoe L., Stewart.  
 Patten, Norman B., Jr., Minneapolis.  
 Pederson, Inga M., Irwin, Ia.  
 Pemberton, Ada M., Eden Prairie.  
 Pengilly, Alice L., Osseo, R. 1.  
 Person, Fred A., Withrow, R. 21.  
 Peterson, Ellen W., Lafayette.  
 Phillips, Dinah S., LeSeur. u  
 Pratt, Hiram E., Woodstock, Ill.  
 Robb, Clarence P., Winona.  
 Robertson, Charles J., Merriam Park, R. 8.  
 Sargent, Clara A., Red Wing, R. 2.  
 Sather, Arnold A., Clear Lake, Wis.  
 Smith, Ralph V., Parkers' Prairie.  
 Southmayd, Winthrop S., Braham.  
 Stone, Allen W., Park Rapids.  
 Sullivan, Jessie, Minneapolis.  
 Thompson, Mark J., Winsted.  
 Thornton, Henry A., Appleton, R. 1.  
 Torgimson, Theofred, Hanska.  
 Tripp, Harry P., Beardsley.  
 Turner, Amelia H., St. Peter.  
 Utter, Gustaf W., Ceylon.  
 Victor, Emmy M., Lindstrom.  
 Viets, J. J. Minneapolis.  
 Watson, Irene, Merriam Park.  
 Wessel, Anthony A., White Bear.  
 Westmark, Arthur A. Minnetonka  
 Mills, R. 2.  
 Wilcox, Richard S., White Bear Lake.  
 Wilson, Lillian M., Granite Falls, R. 1.  
 Workman, George, Villard.  
 Wright, A. D., St. Cloud.

## B CLASS—171

- Adkins, Alice E., Minneapolis.  
 Allen, Percy R., Winona.  
 Anderson, Walter R., Belgrade.  
 Ash, Julia A., Wendell.  
 Balstad, Henry O., Fosston.  
 Balstad, Manda C., Fosston.  
 Barclay, Madge, Stillwater.  
 Barsness, Alfred, Brandon.  
 Barsness, Thilda B., Glenwood.  
 Bartlett, Howard, Ellsworth, Wis.  
 Bartlett, Irving J., Mound.  
 Bede, Russel, Pine City.  
 Behnke, Gretchen, New Ulm.  
 Bennett, William P., Austin.  
 Biscoe, Julius W., St. Paul Park.  
 Bjorka, Knute, Fergus Falls, R. 7.  
 Boe, George R., Lanesboro.  
 Bondeson, Calextus C., Lafayette.  
 Brann, Alonzo S., Minneapolis.  
 Brown, Jessie, Merriam Park.  
 Budde, Theodore G., Kellogg.  
 Busse, Florence A., Merriam Park R. 8.  
 Butterfield, James, Long Lake.  
 Byrne, Fred, Hart.  
 Cantine, Hester E., Walnut Grove.  
 Cantine, Sarah A., Walnut Grove.  
 Carlson, Elvera S., Minneapolis.  
 Carlsted, Alfred, Dassel, R. 5.  
 Carr, Elmer B., Excelsior R. 3.  
 Chase, Willis H., Farmington.  
 Cleator, Ralph A., Minneapolis.  
 Conaughy, Laura C., Minneapolis.



- Cooper, Edgar, Adrian .  
 Corbett, Alice A., Minneapolis.  
 Cunningham, Leon C., Pipestone.  
 Dahlquist, Anna V., North Branch.  
 Dodds, Ralph F., Wheaton.  
 Dodds, Warren, Wheaton.  
 Dorn, Earl O., Brooklyn Center.  
 Doten, Allan L., Osseo R. 1.  
 Dunning, John W., Osseo, R. 6.  
 Durfey, Phineas D., Chatfield.  
 Einarson, Baldwin, Duluth.  
 Ellsworth, Mildred, St. Paul.  
 Elsborg, Ellen, Minneapolis.  
 Ericson, Elmer, Hector.  
 Farrell, Edward, Franklin.  
 Feustel, Nettie C., Fairmont.  
 Finkbinder, David E., Royersford, Pa.  
 Flaten, Peter M., Granite Falls.  
 Fowler, Audrey M., Bethel.  
 Francis, Merritt, Minneapolis.  
 Frear, Aureline J., Minnetonka Mills.  
 Gaynor, Fred A., Milbank, S. D.  
 Gilles, Arthur P., Minneapolis.  
 Groger, Bruce W., St. Charles.  
 Hammerberg, Arvid, Shafer.  
 Hansen, Martin, Eyota.  
 Hanson, Elben, Stillwater.  
 Hart, Charles C., Farmington.  
 Hartkopf, Baldwin, Osseo.  
 Hauge, Effie M., Minneapolis.  
 Helgeson, Emma S., Sacred Hart.  
 Hellie, Clara, Hanley Falls.  
 Hellzen, Wilhelm, Clarkfield.  
 Hennessy Claudia S., West St. Paul.  
 Hewitt, Wyman H., Nassau  
 Hodorff, Gustave, Dixville  
 Hoel, Frank, Minneapolis  
 Holbrook, David W., Markesan, Wis.  
 Holman, Peter A., Minneapolis  
 Howard, Raymond W., St. Paul Park  
 Hoyt, Corrinne, R., Fridley  
 Huntley, Herbert C., Hancock  
 Ingberg, Joseph, Hendrum  
 Jackson, Hjalmer M., St. Anthony Falls  
     Sta., Minneapolis  
 Jackson, Joel F., Minneapolis  
 Joerns, Emelyn R., St. Anthony Park  
 Johanson, Algott B., Wheaton  
 Johnson, Elida S., St. Paul W  
 Johnson, Ella J., Cambridge  
 Johnson, Mabel C., Milan  
 Johnson, Myrtle E., Minneapolis  
 Kain, Raymond, Benson  
 Keefe, George P., Chatfield  
 Kernkamp, Howard C., St. Paul  
 Keenholts, Raymond J., Sta F., Minne-  
     apolis  
 Koehler, George W., Mound  
 Krueger, Elsie S., Bellingham  
 Kueffner, Frederick J., St. Paul  
 Lathrop, æByron G., Hugo  
 Liberg, Benj. A., Haug  
 Lindeman, Otto., North Redwood  
 Locke, Elmer B., Osseo  
 Lundgren, Herbert P., Minneapolis  
 McKenney, Richard E., Minneapolis  
 McNee, William W., Spring Valley  
 Madden, William C., Waseca R 6  
 Manahan, Mathew, Chatfield  
 Mark, Levi E., Goodhue, R 5  
 Mason, Grafton Jr., St. Paul  
 Miller, Carl A., Fawndale  
 Miller, Charles E., St. Paul  
 Myrah, Olga G., Spring Grove  
 Neal, Winifred E., St. Paul  
 Newhouse, Carl O., Brandon  
 Noltimier, Victor B., St. Paul Park  
 Norcross, Everett W., Minneapolis  
 Norris, Bessie M., Minneapolis  
 Nygaard, Hartvick, Hartland  
 Ohland, Frederick H., Gibbon  
 Oliver, Chauncey R., Granada  
 Olson, Burke A., Alberta  
 Olson, Frederick H., Anoka  
 Olson, Henry A., Grove City R 4  
 Olson, Otto, Emmons  
 Ostendorf, Alford, Somerset, R 2 Wis  
 Ostrem, Lewis, Lanesboro R 1  
 Palmer, Calude E., Minneapolis  
 Palmer, Leone, Red Wing  
 Parten, Blanda R., Minneapolis  
 Paterson, Andrew, Wayzata  
 Pemberton, Joseph B., Eden Prairie  
 Peterson, Alget M., Camden Sta., Minne-  
     apolis  
 Peterson, Herbert Charles, White Bear  
 Peterson, Mancel, Waubay, R 3 S. D.  
 Peterson, Olaf O., Hanska  
 Pfeil, Edward F., St. Charles  
 Precourt, Claude W., Plover, Wis R 1  
 Pye, Robert B., Faribault  
 Qualle, Gunder, Kenyon  
 Randal, James H., Hinckley  
 Raymond, Ernest A., Summit, S. D.  
 Rignell, Agnes D., Winthrop  
 Roberts, Henry, Fergus Falls  
 Routhe, Oscar V., Redwood Falls R 4  
 Rudser, Lorentz O., Rudser, N. D.  
 Running, Alma C., Minneapolis  
 Sanders, Amy I., Houston

Sandlie, Hjalmer E., Rushford R 3  
 Schmidt, Paul Hugo R 1  
 Schramm, Lillian, Cottage Grove  
 Schwab, Francesca L., Bennettville  
 Schwantes, Anna M., New Ulm  
 Shaw, Bertha J., Minneapolis  
 Smith, Esther Louise, New Duluth  
 Smith, George G., Chicago  
 Sorenson, John A., Clinton  
 Spencer, Smith W., West Duluth  
 Stensrud, Hans G., Watson  
 Stephl, Otto E., LaCrosse, Wis.  
 Stewart, Alton R., St. Paul  
 Stewart, Clarence E., Forest Lake  
 Strong, Hazel C., Bethel  
 Stutzman, Harry J., Newport R 19

Theilmann, Edward C., Hancock  
 Theilmann, Ivy A., Excelsior  
 Thompson, Milton C., Franklin  
 Thorson, Neil, Minneapolis  
 Trovatten, Rollef A., Hanley Falls R. 1  
 Van Doren, Arthur L., Farmington  
 Warwick, James T., Goodhue R 5  
 Weidt, Elsie W., Merriam Park R 8  
 Welum, Olaf M., Mabel  
 White, Clifford K., Monticello R 2  
 White, Glenn B., Minneapolis  
 Wickstrom, Hattie, Anoka R 1  
 Wilkins, Stanley D., Minneapolis  
 Wood, Harold W., Granada  
 Woodward, Arthur I., St. Paul Park  
 Young, John C., Montrose

## C CLASS—368

Aamodt, Arne Wergeland, St. Paul  
 Aanes, Hans G., Clarkfield  
 Aiton, Albert Rankin, Minneapolis  
 Allen, Winthrop D., Wolverton  
 Anderson, Amil, Houston  
 Anderson, Arthur Lawrence, St. Paul  
 Anderson, Carl M., Alpha  
 Anderson, Louisa C., Hopkins R. 3  
 Anderson, Mabel J., Hills  
 Anderson, Reuben E., Goodhue  
 Anderson, Ruth L., Marine  
 Anderson, Serena B., Ortonville  
 Andreassen, Sigurd K., Minneapolis  
 Arhart, Henry H., Thief River Falls  
 Arneson, Leonard, Shelly  
 Arneson, Millard E., Shelly  
 Atwood, Warren C., Minneapolis  
 Bahls, Ernest J., Round Lake  
 Baitinger, Alice L., Hutchinson  
 Baker, Ernest C., Monticello  
 Barnes, Leslie A., Lockhart  
 Bartlett, Marion G., Ellsworth, Wis.  
 Baukol, Marcus, Starkbuck  
 Bean, Wm. Elliot, Anoka  
 Beck, Joseph N., St. James  
 \* Bengston, Arthur T., Hopkins  
 Benson, Noel C., Gibbon  
 Berg, Jesse F., Dundas  
 Bestland, John, Hanley Falls  
 Billings, Benjamin R., Audubon  
 Billingsley, H. Fay., Minneapolis  
 Blaycock, Edna L., St. Paul  
 Blees, Marie E., Wolf Creek, Wis  
 Blien, Oscar A., Hanska  
 Boettcher, Henry C., Isanti  
 Bonney, Harold B., St. Louis, Mo.

Borraas, Joseph A., Dawson  
 Borden, Wilber D., New Brighton  
 Bork, Carl A., Paynesville  
 Bostad, Lawrence S., Fosston  
 Bowers, Earl W., Monticello  
 Bowers, Roland U., Monticello  
 Boyles, Edward M., St. Paul  
 Bradford, Frank H., Farmington  
 Branch, Uriah C., White Bear  
 Brandt, Conrad R., Morris  
 Brewster, James S., Brown Valley  
 Brewster, Nancy S., Brown Valley  
 Broadbent, Esther M., Cedar  
 Brooks, Hollis K., Lake City  
 Brown, Harry J., Paynesville  
 Brown, Jesse F., Cedar  
 Brown, Mabel Fannie, Hopkins  
 Brown, Paul C., Cresco, Ia.  
 Bruesehoff, Bertha M., Norwood  
 Bruesehoff, Rose D., Norwood  
 Burtnes, Edwin O., Caledonia R. 1  
 Cadwell, Guy, Windom  
 Calvert, Luella A., St. Paul  
 Canton, Adolph G., Watson  
 Carlberg, Lydia, Pennock  
 Carlisle, Fisher A., Wyoming  
 Carnes, Floyd Edward, Jackson  
 Caswell, A. Mildred, Anoka  
 Caulfield, Clark E., Byron  
 Caulfield, Harold S., Byron  
 Chamberlain, Glenn W., Minneapolis  
 Chamberlain, Morris A., Hastings  
 Chapman, Lloyd E., River Falls, Wis  
 Chesley, Henry Geo., Beardsley  
 Christianson, Richard, Dawson  
 Clark, Gale L., Stillwater

- Clark, Merritt C., South Park  
 Cleland, Lawrence E., Merriam Park, R 3  
 Clinton, Irving J., Watkins  
 Colberg, Benjamin J., Gladstone R. 2  
 Cole, Bernice M., Minneapolis  
 Cole, Lillian V., Minneapolis  
 Collins, Benjamin F., Minneapolis  
 Connor, Ralston I., Albert Lea  
 Cox, Eleanor M., St. Paul  
 Crandall, Austin, Medford  
 Cronin, Charles P., Sutton, Nebr.  
 Cross, David, Childs  
 Currie, Margaret E., Vesta  
 Cutler, N. Irwin, Glencoe R. 6  
 Dahlberg, Seila A., St. Paul  
 Dahley, Thomas, Hanley Falls  
 Dale, Manley H., Renville  
 Danielson, Howard H., Hendricks  
 Davis, Arthur W., Clear Lake  
 Davis, Frank L., Clear Lake  
 Davis, Ormel H., Walnut Grove  
 Delp, Lester E., Hancock, R. 3  
 Dernell, Adolf, Chicago, Ill  
 Dick, Frank C., Afton  
 Dittbenner, Emily M., Minneapolis  
 Dixon, Charlotte M., North St. Paul  
 Dixon, Leon M., Mora  
 Dobbedal, Justin L., Guthrie  
 Doyle, Marquis, St. Cloud  
 Drake, Victor E., Ruthton  
 Durkee, Victor I., Winnebago  
 Eastman, Abel F., Beardsley  
 Edwards, Harry D., Wauchope, Sask. Can  
 Edwards, Thomas H., Garvin  
 Eggar, Mathew C., St. Paul  
 Ekman, Ruth M., St. Paul  
 Eliason, Martin A., Artichoke Lake  
 Ellickson, Guy R., Madison  
 Enright, William J., Rose Creek  
 Evjen, Hilmar, Haug  
 Falde, Alma Judith T., West St. Paul  
 Falling, Albert, Dassel  
 Farness, Orrin, Milan  
 Feist, Arnold A., Gladstone R. 7  
 Fenlason, Roy S., Minneapolis Sta. F.R. 1  
 Findahl, Clara S., St. Paul  
 Findahl, Norman T., St. Paul  
 Fink, Anna M., Waconia  
 Fink, Rosalie H. T. Waconia  
 Finney, Carl, Georgetown  
 Flaten, Alice L., Granite Falls  
 Forster, Bess I., Minneapolis  
 Friedman, David., St. Charles, Ill.  
 Gardner, Heber Wm., Long Lake  
 Garvey, Marian L., Minneapolis  
 Garvey, Olive R., Minneapolis  
 Gilbert, Henry C., White Bear Lake  
 Gilbertson, Julian G., Utica, R. 1  
 Gill, James N., Northfield  
 Gillis, Ernest B., Walnut Grove  
 Gossman, Paul E., Canton  
 Grandstrand, Ruth M., Otisville  
 Gregson, Kenneth S., Minneapolis  
 Grevstad, Johanna E., St. Paul  
 Griffiths, Benjamin, Ottawa  
 Grothe, James, Hendrum  
 Haaland, Odin., Hendrum  
 Haatvedt, Edward B., Kensington  
 Hagestande, Thea O., Madelia  
 Haggard, Charles H., Worthington  
 Hamilton, Carrie L., Osseo, R. 2  
 Hamilton, Juna M., Osseo, R. 2  
 Hansen, Otto C., Centuria, Wis  
 Hanson, Arthur Melvin, Herman  
 Hanson, Harry M., Fergus Falls  
 Hanson, Wallace W., Hendricks  
 Harris, William M., Dundas  
 Harrison, Harold H., Red Wing  
 Hauck, Percy, Madison  
 Heales, Robert L., Canton  
 Heebink, Laura D., Baldwin, Wis.  
 Hendrickson, Mabel P., Mahtomedi  
 Henry, James A., Dover  
 Hermanson, Albert H., Utica  
 Herum, Arthur S., River Falls  
 Higbie, Floyd C., Eden Prairie  
 Hilden, Marie G., Watson  
 Hillman, Grover W., Minneapolis  
 Hodge, Helen F., Minneapolis  
 Hoken, Julia A., Minneapolis  
 Hollihan, Thomas J., Litchfield  
 Holm, Mabel S., St. Paul  
 Houske, Joseph A., Halstad  
 Howe, Blanche, Robbinsdale  
 Hughes, John S., Ellsworth, Wis  
 Huke, Herbert, Nerstrand  
 Hundeby, Irving, Beardsley  
 Hunt, Helen L., St. Cloud  
 Hursh, Mertie L., Henning  
 Husebo, Elmer H., Madison  
 Ilstrup, Inez M., Minneapolis  
 Ingbert, Benhard, Hendrum  
 Iverson, Edwin I., Watson  
 Iverson, Henry A., Watson  
 Jalley, Ida M., Minneapolis  
 Jalley, Mary F., Minneapolis  
 Jirik, Thomas A., Webster  
 Johanson, Ruth C., St. Paul  
 Johnson, Emma C., Hector  
 Johnson, Victoria J., Hopkins, R. 3

- Jones, Laurence G., Minneapolis  
 Jorgenson, Waldemar, Tyler  
 Kalmoe, Hjalmar, Montevideo  
 Kalstrom, Oscar J., Milan  
 Kanton, Emma J., Milan  
 Kempton, James H., San Antonio, Texas  
 Kendal, Eva, St. Cloud  
 Kendal, Guy B., Minneapolis  
 Kingsley, Arthur R., Stranton, N. Dak  
 Kinsey, Grace M., Ottawa  
 Kratt, John A., Morristown  
 Krieg, Paul N., Johnson  
 Krueger, Louis B., Stillwater  
 LaCrosse, Charles F., Audubon  
 Lancaster, Charles E., Wheaton  
 Lang, Raymond W., St. Paul  
 Lange, Otto H., Marietta  
 Larson, Edna V., Nelson  
 Larson, Elmer V., Nelson  
 Larson, Elsie S., Pennock  
 Larson, Grace O., Nelson  
 Larson, Lars J., Hendrum  
 Lathrop, Leslie T., Forest Lake  
 Leaf, Bernard P., Parkers Prairie  
 LeBorius, Frank, Minneapolis, Sta. F., R 3  
 Lemke, Henry A., St. Francis  
 Leonard, Bessie P., Rock Springs, N. Dak  
 Lilly, Elma E., Houston  
 Lindberg, Hattie H., Robbinsdale  
 Loftness, Olga E., Gibbon  
 Long, Lloyd D., Luverne  
 Lord, Herbert S., Barnum  
 Lyngen, Edward, Watson  
 McCausland, Frank, Robbinsdale  
 McNary, James W., Kellog  
 McNeil, Earl A., Dayton  
 Madson, Merlin M., St. Paul  
 Mahlum, Howard J., Brainerd  
 Maltrud, Olaf L., Granite Falls  
 Mann, C. Howard, Excelsior, R. 1  
 Marget, Arthur, Isanti  
 Matthews, Ralph F., St. Paul  
 Mattimore, Arthur R., St. Paul  
 May, Elgie L., Wayzata, R. 1  
 Mecklenburg, Edward J., Cedar  
 Mecklenburg, Daniel O., Cedar  
 Melin, Robert, Monticello  
 Merdink, Ray, Stephen  
 Messner, George W., Hancock  
 Meyer, Carrie F., St. Paul  
 Meyer, William, St. Paul  
 Miles, Hattie A., St. Paul  
 Miller, Ralph M., Robbinsdale  
 Mills, Elmer C., Brookfield  
 Moldenhauer, Ernst, Owatonna  
 Moline, Carl C., Excelsior, Box 87  
 Monson, Clifford E., Elbow Lake  
 Monson, Minnie, Belview  
 Morken, Oscar E., Bellingham  
 Morrill, Lee W., Granite Falls  
 Munger, Rai P., Ellsworth, Wis.  
 Munsell, Ray D., Morton  
 Munson, Helma A., St. Paul  
 Nelson, Dan M., St. Paul  
 Nelson, Elmer V., Nelson  
 Nelson, Walter O., Dwight, N. Dak.  
 Newhall, Webb A., Clinton Falls  
 Newquist, Linnea B., Minneapolis  
 Nodell, Mabel V., Minneapolis, Sta. F. R. 4  
 Nolan, Frederick E., St. Paul  
 Nordtomme, Anna, Watson  
 Novak, Frank, Effington, S. Dak.  
 O'Grady, May L., St. Paul  
 O'Reilly, Robert E., St. Paul  
 Olson, Agnes M., Watertown  
 Olson, Fred W., Maple Plain  
 Orton, Irvin J., Elk River  
 Osbloom, Marie, St. Paul  
 Ostenso, Helga C., Montevideo  
 Ostrem, Oscar U., Lanesboro  
 Ouren, John B., Hanska  
 Oyen, Emma, Watson  
 Patterson, Hazelle E., St. Charles, R. 1  
 Pearson, Carl A., Louisburg  
 Pederson, Wellington E., Hopkins  
 Penniman, William C., St. Paul  
 Peterson Amy A., Otisville  
 Peterson, Berier, Haug  
 Pfeilsticker, Linn, Wabasha  
 Philley, Clarence G., Mazeppa  
 Ponthan, Harold A., St. Paul  
 Praught, William V., Rogers  
 Prince, Edward B., Minneapolis  
 Quist, Axel L., Cannon Falls, R. 7  
 Rasmusson, Albert, Pomonkey, Md.  
 Reeve, Pomeroy P., Tenstrike  
 Richardson, Forrest E., New Brighton  
 Richardson, Harold I., New Brighton  
 Ritchell, Willis, St. Anthony Sta., Minneapolis  
 Robertson, George L., Merriam Park, R 8  
 Robertson, Harry A., Merriam Park, R. 8  
 Rogers, Clarence E., Ellsworth, Wis.  
 Rodgers, Vincent B., Nashwauck  
 Rorrison, Lawrence P., Minneapolis  
 Rosander, Thomasine, Minneapolis  
 Ruedlinger, Louise S., Minneapolis  
 Samuelson, Ruth V., Lafayette  
 Sandager, Kristian, Tyler  
 Sandager, Nels S., Tyler



Sanvik, Andrew T., Starbuck  
 Satchell, Ethel C., Minneapolis  
 Sawhill, Donald, Nimrod, Mont.  
 Schanche, Clara E., Star Prairie, Wis.

## R. 1

Schillinger, Emma M. Sta. F., R. 2, Minneapolis

Schmidt, Herbert, West Concord  
 Schuette, Daniel C., Waseca, R. 3  
 Searles, Dewitt M., New Brighton  
 Searles, Monna B., New Brighton  
 Seekins, Clinton B., St. Paul  
 Selthun, Ennis A., Rolette, N. D.  
 Sewal Dorothy D., St. Anthony Park  
 Shelp, Mabel F., Litchfield  
 Siemer, Edward C., Moose Lake  
 Sillrud, Martin, Greenbush  
 Silsbee, Leila, Chatfield  
 Simon, Peter, Altura  
 Sindt, Albert H., Rock Rapids, Iowa  
 Skow, Morris, Springfield  
 Skrukud, Gust B., Fountain  
 Sletta, Ida O., Madelia  
 Smith, Bertram A., Osseo  
 Smith, Clara May, Ortonville  
 Smith, David E., Ortonville, R. 3  
 Smith, Frank, St. Cloud  
 Smith, Ida F., Robbinsdale, R. 3  
 Smith, John F., San Antonio, Texas  
 Smith, Randolph H., Minneapolis  
 Snell, Ruth E., Merriam Park  
 Solberg, Elmer C., Spring Grove  
 Sorlien, Oscar C., Bode, Iowa  
 Spencer, Hamilton, H., Henderson  
 Spencer, Henry J., Minneapolis  
 Steffens, Bonnie R., Racine  
 Stensrud, Edward, Watson  
 Stensrud, Louise L., Watson  
 Stensrud, Martin, Watson  
 Stoddard, Mildred, St. Paul  
 Stoltenberg, Frank, Elk River

Sundberg, Daniel, Foreston  
 Swedberg, Joseph L., White Bear  
 Sybilrud, Ella O., New Richland  
 Sybilrud, Nora M., New Richland  
 Tangen, Olena A., Hazel Run  
 Thompson, Charles L., Wayzata  
 Thompson, Thomas B., Hendrum  
 Thorwick, Arthur J., Thief River Falls, R. 2  
 Tolaas, Gudrun Marian, St. Paul  
 Torkelson, Carl A., St. James  
 Tulin, Nels O., Hardwick  
 Turnham, Alice, Long Lake  
 Turnquist, F. Arthur, Cleron, N. Y.  
 Ulrich, John, Wabasha  
 Underdahl, John A., Nerstrand, R. 2.  
 Veitch, Leora M., Rush City  
 Villars, Wendel D., Minneapolis  
 Voak, Jay P., Worthington  
 Waterman, John F., Minneapolis  
 Waters, Henry B., Forest Lake  
 Waters, Luella E., Forest Lake  
 Weldy, Bertha M., Marietta  
 White, Leslie A., Minneapolis  
 Whiting, Laura M., Sta. F., R. 2 Minneapolis  
 Wilkinson, Ora J., Minneapolis  
 Willford John C., Garvin  
 Williams, Floyd J., Sta. F. R. 4, Minneapolis  
 Wilson, Bessie M., Ihlen  
 Wilson, Selmer C., Clarkfield  
 Winter, Harry A., Lowel, Mass.  
 Winters, Laurence M., Mazeppa  
 Wood, Edgar R., Warren  
 Woodbury, Dora L., Minneapolis  
 Woodfill, Charles H., Litchfield, R. 1  
 Wright, Dean A., Austin  
 Youngren, Ruth A., Minneapolis  
 Zimmerman, Robert, Browton  
 Zwick, Harry R., Lake City.  
 \* Died Oct. 29th, 1908

## TEACHER'S SUMMER SCHOOL—90

Alexander, Wm. A., Morristown  
 Aylesworth, Vivian, Litchfield, R. 8,  
 Baldwin, Mary E., Pipestone  
 Bebermeyer, H. J., Redwood Falls  
 Bigelow, Mary, 4323 Dupont Av. S.,  
 Minneapolis  
 Bigelow, Mrs. Mary L., 4323 Dupont Av.  
 S., Minneapolis  
 Bodin, George, Young America, Minn.  
 Boer, Ellen M., Coleraine  
 Booth, Hattie F., Grand Rapids

Borchardt, Otilie, Madison  
 Brodt, Lillie, 819 Reane St., St. Paul  
 Burgess, Edith, Allen, Neb.  
 Bush, Ethel, 1119 6th St., S. E., Minne-  
 apolis  
 Butler, P. J., Chaska  
 Carlson, Oscar, Preston  
 Carter, Mrs. Sine, Drayton, N. D.  
 Cedergren, Edwin A., Lindstrom  
 Crowe, Edward J., Dresbach  
 Cummings, Emogene, White Bear Lake



Cunningham, Eugenia, Pipestone	Le Gro, Emma, Bertha
Cunningham, Mabel, Pipestone	Le Gro, Fannie, Bertha
Edwards, Lucile, Little Falls	Lewis, J. H., Fairbault
Elmer, Margaret, Chatfield	Lipp, Mrs. C. C., St. Anthony Park
Erickson, Ellen, Alexandria	Lommen, Georgine, Caledonia
Erickson, T. A., Alexandria	Lord, Eva, Ghent
Falney, Nellie, 311 13th St., St. Paul	McAulty, H. T., Red Lake Falls
Farrell, Margaret, Franklin	McCormick, Mrs. Harriet, Grand Rapids
Faunce, C. S., 1100 15th Av. S. E., Minneapolis	Martin, Florence, Rochester
Finnegan, Wm., Thief River Falls	Mithun, L. M., Warren
Freeman, C. J., Herman	Nelson, Arthur, Ivanhoe
Granger, E. M., Breckendrige	Neville, Clara, Eyota
Hall, Grace, Morris	Olson, Hermina, Lonsdale
Hargrave, A. W., Cokato	Peake, Laura, Eagle Bend
Hargrave, Mrs. A. W., Cokato	Pickard, A. E., Hinckley
Harrington, Frank, Hutchinson	Plough, Betty, Rice
Hegel, Newton H., Cambridge	Pulver, Anna D., Canton
Higbie, E. C., Canby	Richard, Belle, St. Cloud
Holzinger, J. M., Winona	Roberts, R. S., Morris
Hoover, Harriet, Duluth	Robinson, Katherine, Rochester
Hov, I. S., Bagley, Minn.	Roddie, Bertha F., Long Prairie
Howell, Mrs. D. B., St. Anthony Park	Schultz, Dorothy, M., New Richland
Howell, Sarah, Dawson, Wis.	Sherwood, Grace, Austin
James, Mrs. Mary B., Minneapolis	Siemer, Minnie, Moose Lake
Johnson, Ella A., Hancock	Smith, Sarah A., New Duluth
Kent, A. R., Lanesboro	Swanson, E. N., Stillwater, R. 7
Kerkamp, Clara, Newport	Swenson, Alma, Maynard
King, Katherine A., Duluth	Thorson, M. A., Winthrop
Kittleson, Arthur, Montevideo	Tidd, John N., Meadowlands
Knebel, Celia, Pequot	Toevs, Frank J., Mountain Lake
Kranz, Daisy M., 3821 Stevens Av., Minneapolis	Trask, Mrs. A. M., Herman
Kranz, Kate M., 3821 Stevens Av., Minneapolis	Waldron, Ruth, Rochester
Krayenbuhl, Emilie, Excelsior	Walkup, Jessie E., Pipestone
Krueger, Mary E., Bellingham	Webb, Florence B., Dawson
	White, Hope, Winnebago
	Wilcox, Myrtle E., Hancock
	Wilson, Mrs. A. D., St. Anthony Park

## SUMMER FORESTRY SCHOOL—18

Baker, Norman M., Davenport, Ia.	Foss, Elizabeth H., Minneapolis.
Beebe, W. L., Jr., St. Cloud.	Garland, N. R., Minneapolis.
Berry, James B., St. Paul.	Hamilton, Carl L., Minneapolis.
Blades, W. F., Dubuque, Ia.	Mears, Louise, Peru, Neb.
Bohn, George J., St. Anthony Park.	Merrill, F. B., Stillwater.
Canavaro, George DeS., Honolulu, Ha.	Schwedes, Carl, Wabasha.
Cochrane, H. H., Minneapolis.	Wanberg, Richard, Benson.
Collin, William H., Northwood, Ia.	Wilson, Leila, Gridley, Ill.
Dummer, R. C., New Ulm.	Witbeck, Fanny, Colorado Springs, Colo.

## FARMER'S SHORT COURSE—169

Aamodt, Carl, St. Paul.	Amundson, Ole, Hanska.
Abrahamson, H. B., Dassel.	Anderson, Anton, West Concord.
Akins, Arthur T., Mayer.	Anderson, Awley, Hallock.

- Anderson, Carl, Oberon, N. D.  
Anderson, D. O., Meadowlands.  
Anderson, Fred C., Glyndon.  
Anderson, Oscar C., Hendricks.  
Asquith, Ralph, Windom.  
Aubrecht, Joseph, Beroun.  
Axness, Melvin, Pelican, Rapids.  
Bang, Andrew, Madison.  
Benjamin, Camille, Faribault.  
Bennett, Norval, Anoka Route No. 1.  
Bieder, J. T., Belle Plaine.  
Bjorgum, Martin, Jackson.  
Blanksma, D. W., Dodge Center.  
Bolland, Dick Henning R. 2.  
Boraas, Albert, Hallock.  
Bosin, Bruno, Mankato.  
Bradley, Walter, Anoka.  
Brandon, J. O., Kensington.  
Brant, August, Woodstock.  
Brazell, Curinne, Minneapolis.  
Brazell, C. A., Minneapolis.  
Bredemeier, William, Barnesville.  
Broms, Henning, Excelsior.  
Burke, J. W., Deephaven.  
Burtness, Peter, Cook.  
Burtman, Roy, Pipestone.  
Cameron, Douglas, Hallock.  
Chalupnik, J. J., Beroun.  
Champion, Mrs. Dagmar, Braham.  
Chapman, Carl S., Westbrook.  
Cheney, Eugene, Northfield.  
Cheney, Jesse L., Northfield.  
Conrad, John, Luverne.  
Craven, John, Faribault.  
Crawford, George L., St. Paul.  
Dahleen, Arthur A., Maynard.  
Dime, O. E., Grove City.  
Dupuis, Ralph, New Richmond, Wis.  
Ekegron, Oscar, Otisville.  
Erickson, Arthur, Cambridge.  
Erickson, C. R., Hagar, Wis.  
Forfang, Egill, Hallock.  
Franz, Jacob, M., Mountain Lake.  
Flynn, D. H., Beardsley.  
Frederick, Paul, Ottertail.  
Frederickson, C. A., Hanska.  
Frederickson, Clarence, Hanska.  
Gackstetter, Harry W., Iner Grove.  
Gasink, William, St. James.  
Gran, Walter, Spring Grove.  
Grant, A. D., Redvers, Sask. Can.  
Gulbrandson, R. M., Albert Lea.  
Haatvedt, Ole M., Kensington, R. 2.  
Halvorson, Syverind, Hancock.  
Handke, J. B., Waltham.  
Hansen, Albert W., Baldwin, Wis.  
Hanson, Jens L., Raymond, R. 5.  
Hanson, Walter, Hallock.  
Hector, Emery, Worthington.  
Hegseth, Nels, Fergus Falls, R. 6.  
Hertel, A. G., Braham.  
Hilden, Herman, Watson.  
Hilgers, John P., Barnesville.  
Hohenstein, Albert, Loretto.  
Holen, Melvin, Parkers Prairie.  
Howard, John, Hammond.  
Hunt, F. K., St. Cloud.  
Iverson, Eddie, Watson.  
Jensen, Alfred, Nelson.  
Johnson, Carl, Pelican Rapids.  
Johnson, John C., Langford, S. D.  
Johnson, C. S., Albert Lea.  
Jorstad, Melvin, Kenyon.  
Kaeder, Leo, North St. Paul.  
Kalmoe, George, Montevideo, R. 6.  
Kelly, Michael Jr., Garfield.  
Kepler, R. J. Jr., Nisswa.  
Kepler, Mrs. R. J., Nisswa.  
Knutson, Albert, Pelican Rapids.  
Knutson, Ed., Adams.  
Koehnen, Lawrence, Cologne.  
Kunkel, Reinholdt, Rapidan.  
Kurtz, Louis, Milwaukee, Wis.  
Larson, Harry W., Murdock.  
Larson, Swend, Rothsay.  
Lawrence, O. A., Minneapolis.  
Leach, William, Bird Island.  
Lees, John D., Benton.  
Lermon, Guy Starbuck.  
Lien, Allie, Garvin.  
Lindberg, Nelbert, Deer Park, Wis.  
Lynn, Frank, Grand Rapids.  
McCall, Thomas, Mankato.  
Malcolm, Wm Jr., Bigelow.  
Marien, Frank, Highwood.  
Martinson, Lawes, Correll.  
Mergen, Henry E., Hutchinson.  
Mickelson, Martin, Groningen.  
Miller, Freeman, Lakeville.  
Miller, R. F., Olivia.  
Moen, Anton, Esmond.  
Monson, Sture, Dassel.  
Moran, Catherine, Farmington.  
Moran, William, Farmington.  
More, Clarence, Elmore.  
More, George H., Elmore.  
Morrison, F. G., Otisville.  
Morton, C. H., St. Louis Park.  
Munson, Edward, Pelican Rapids.  
Munson, Martin, Pelican Rapids.

Murphy, William, Lakefield.	Schooley, Clayton, Minneapolis.
Nelson, Carl J., Nelson.	Severtson, Severt, Hills.
Nelson, Edwin, Garvin.	Sharkey, William, J., Belle Plaine.
Nelson, Hans, St. Anthony Falls, Sta., Minneapolis.	Shearer, Clarence, Osseo.
Nelson, Oscar E., Lakeland.	Skarphol, John, Madelia.
Nissen, Carl, Lake Wilson.	Skinness, O. M., Kenyon.
Nystrom, Axel, Foreston.	Stennes, Alfred, Halsted.
Oberg, Ole, Hanley Falls.	Svendsen, Hans C., Tyler.
O'Dwyer, Robert M., St. Cloud.	Swanson, Adolph, Litchfield.
Ogren, John Langford, S. D.	Swenson, Victor T., Otisville.
Orban, William, Silver Lake.	Threde, Harry, Lake Park, Ia.
Ostenso, Olaf, Motevideo.	Tisdell, Thomas, Olivia.
Peterson, Albert, Sleepy Eye.	Toelle, Andrew, Browne Valley.
Peterson, Arthur, Cambridge.	Untiedt, Albert, Lake Park.
Peterson, Charles Effie.	Vollum, Martin, Hayward.
Peterson, Otto, Lake Benton..	Voss, A. R., St. James.
Peterson, Peter, Isanti.	Webb, Charles P., Medford.
Pfeil, George, Worthington.	Webster, Paul, Minneapolis.
Pridal, Joseph, Taunton	Westermo, Alfred, Kenyon.
Quevli, Antony, Lakefield.	Westlie, Carl, Beaver Creek.
Roach, C. E., Minneapolis.	Whitcomb, Noyes H., Monticello.
Roppnen, Matt, Embarrass.	Wicklund, Lawrence, Atwater.
Ryden, Carl, J., Kennedy.	Wigdahl, Gabriel, Rothsay.
Saue, Hans O., Montevideo.	Williams, Charles G., Minneapolis.
Saue, Peter P. Jr., Montevideo.	Wilson, Frank, Gridley.
Schneider, John Walter, White Bear Lake.	Wright, Dean A., Austin.
	Zimmerman, Robert, Brownton,

## DAIRY SCHOOL STUDENTS—107

Abbe, Herman F., Meriden.	Donney, W. H., Glencoe, R. 3.
Anderson, Par O., Garvin.	Elfstrom, Henry W., Lindstrom.
Anderson, Peter Lewis, St. Hilaire.	Elseth, H., West Valley.
Bakken, John H., Scarrville, Ia.	Findell, Eric A., Cambridge. R. 5.
Bartelt, Frank H., Royalton, R. 4.	Fish, Lee, St. Peter.
Beberstein, Hugo, West Concord.	Flom, Anthony, Flom.
Belknap, George A., Isanti.	Gonen, Frank, Cologne.
Benson, Charlie, Clear Lake.	Greethurst, Thomas M., Lewiston.
Berthney, Edward, La Crosse, Wis.	Grundeen, B. F., Murdock.
Borgmann, V. W., Mayer.	Gunderson, Marcus J., Royalton R. 4.
Borgmann, Victor, Mayer.	Hanson, E., Edgerton, Wis.
Brestad, Lars G., Appleton.	Hanson, Hans L., Albert Lea.
Brookins, Harry L., Cokato, R. 3.	Harth, Frank, Minneapolis.
Bullis, V. L., Washburn, Wis.	Hedlund, N. J., Annandale, R. 2.
Call, Anton E., St. James, R. 4.	Herbison, R. H., Fargo, N. D.
Camp, Alfred, Ellendale.	Hogoot, Clarence, Berlin.
Carswell, Robert A., Clear Lake, Wis.	Hudovernik, Frank, Rice, R. 2.
Cassidy, Charles M., Springfield.	Huro, John W., Annandale.
Chalupnik, James J., Beroun.	Ipsen, August, New Holstein, Wis.
Chancellor, Floyd, Delano.	Jacobs, L. M., Cold Springs.
Clarke, Frederick B., Fergus Falls	Johnson, Carl A., Beresford, S. D.
Dahlgren, Theodore, Freedham.	Johnson, Eval L., Clarissa.
Dahlvig, Gustav A., Atwater.	Jones, Allen W., Garvin.
Denison, Earl, Hutchinson.	Kane, James, Minneapolis.
Derosier, F., Terrebonne.	Knutson, John A., Rapidan

- Kollmann, Peter, Buckman.  
Kreinbring, Louis E., Stockton.  
Krogstad, Oscar J., Eau Claire, Wis.  
Kuist, Gordon F., Odessa.  
Laabs, W. C., New Auburne.  
La Chance, Peter, Huot.  
Lhotka, Victor, Silver Lake.  
Lindberg, Christ, Beltrami.  
Lougren, Oscar, Richardson, Wis.  
Ludke, Rinhold, Sebek.  
Lund, Otto, J., Lake Mills, Ia.  
Matti, Louis, Mantorville.  
Meyer, John K., Webster.  
Miller, Edward E., Kasson.  
Miller, J. C., Augusta, Wis.  
Nelson, Henry K., Lake Mills. Ia.  
Nereson, Albert, Gary.  
Nielson, Martin A., Shafer.  
Norskog, Theodore, Portland, N. D.  
Nyflot,, Ole O., Jr., Newfolden.  
Paulson, Henry Clarissa.  
Peterson, Erick, Long Prairie.  
Peterson, Henry W., Clarke Grove.  
Pier, Roy D., New York Mills.  
Place, Leonard, Ellsworth, Wis.  
Poppler, John Jr., Chaska.  
Precht, Fred, St. Claire.  
Regnstrand, W., McIntosh.  
Robinson, Percy, Houston.  
Roed, Jorgen, Fertile.  
Rohe, Fred M., Osseo.  
Rosemeisl W., Rosco.  
Rouse, Fred, Lewiston.  
Rude, Alfred, Gary.  
Schroeder, Henry C., Lester Prairie.  
Schuster, Louis, Owatonna.  
Scott, John E., Dover.  
Seibel, John A., Bowbells, N. D.  
Shoquist, George W., Withrow.  
Skoglund, Martin, Eagle Bend.  
Solheid, John A., Belle Plaine.  
Sederberg, E. M., Cannon Falls.  
Sorenson, Einer, Kandiyohi.  
Spjut, Herman, Strathcona.  
Stadheim, John O., Austin.  
Stomsvik, Ole, Badger.  
Swinghamer, A. W., Albany.  
Schwinghammer, John, Springfield.  
Taftner, John L., Gary.  
Thorsell, Berger, Argyle.  
Thoen, Christian C., Wannaska.  
Wallin, Walter E., Atwater.  
Weist, Fred. L., Dakota.  
Winnberg, Ola A., Leon.  
Wilson, Henry, Spring Grove.  
Witte, Henry W., St. Cloud.  
Woodfill, Elmer J., Owatonna.











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